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Lexical Link Analysis Application: Improving Web Service to Acquisition Visibility Portal Phase II

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14. ABSTRACT

We define awareness as the cognitive interface between decision-makers and a complex system, expressed in a range of terms or features, or specific vocabulary or lexicon, to describe the attributes and surrounding environment of the system. Lexical Link Analysis (LLA) is a form of text mining in which word meanings represented in lexical terms (e.g., word pairs) can be represented as if they are in a community of a word network. In the past, we have explored how LLA systematically and automatically discovers new patterns that were previously unknown, and identifies data dependencies from large-scale defense acquisition data of multiple programs that might be indicators for program or investment performances in defense acquisition decision-making and research communities. We also started to apply LLA to improve our understanding of the quality of the data by comparing categories of information and by detecting data overlaps, inconsistency, and gaps from a single program point of view. The Acquisition Visibility Portal (AVP) is a critical tool that provides the DoD-wide acquisition community with authoritative and accurate data services via interfaces to Defense Technical Center (DTIC) and Defense Acquisition Management Information Retrieval (DAMIR) for programs (e.g., major defense acquisition programs [MDAPs], acquisition category II [ACATII] programs) with milestones, costs schedules and performance data, selected acquisition reports (SAR), acquisition strategy reports (ASR), the systems engineering plans (SEP), the test & evaluation master plans (TEMP), and the defense acquisition executive summary (DAES), among others. The major advantage of using LLA is to apply automation to reveal and depict?to decisionmakers? the correlations, associations, and program gaps across all the programs in the AVP over many years. This enables strategic understanding of data gaps and potential trends, and can inform managers what areas might be highly risky for a program and how resource and big data management might affect the desired return on investment (ROI) among projects.

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Panel 17. Predicting Performance and Interdependencies in Major Defense Acquisition Programs

Thursday, May 15, 2014	
1:45 p.m. – 3:15 p.m.	**Chair: Nancy L. Spruill,** Director, Acquisition Resources & Analysis, Office of the Under Secretary of Defense (Acquisition, Technology, & Logistics) ***A Scalable Approach to Modeling Cascading Risk in the MDAP Network*** Anita Raja, University of North Carolina Charlotte Mohammad Hasan, University of North Carolina Charlotte Shalini Rajanna, University of North Carolina Charlotte Ansaf Salleb-Aouissi, University of North Carolina Charlotte ***Promoting Affordability in Defense Acquisitions: A Multi-Period Portfolio Approach*** Navindran Davendralingam, Purdue University Daniel DeLaurentis, Purdue University ***Lexical Link Analysis Application: Improving Web Service to Acquisition Visibility Portal Phase II*** Ying Zhao, Naval Postgraduate School Shelley Gallup, Naval Postgraduate School Douglas MacKinnon, Naval Postgraduate School

Lexical Link Analysis Application: Improving Web Service to Acquisition Visibility Portal Phase II

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Abstract

We define *awareness* as the cognitive interface between decision-makers and a complex system, expressed in a range of terms or features, or specific vocabulary or lexicon, to describe the attributes and surrounding environment of the system. Lexical Link Analysis (LLA) is a form of text mining in which word meanings represented in lexical terms (e.g., word pairs) can be represented as if they are in a community of a word network. In the past, we have explored how LLA systematically and automatically discovers new patterns that were previously unknown, and identifies data dependencies from large-scale defense acquisition data of multiple programs that might be indicators for program or investment performances in defense acquisition decision-making and research communities.

We also started to apply LLA to improve our understanding of the quality of the data by comparing categories of information and by detecting data overlaps, inconsistency, and gaps from a single program point of view. The Acquisition Visibility Portal (AVP) is a critical tool that provides the DoD-wide acquisition community with authoritative and accurate data services via interfaces to Defense Technical Center (DTIC) and Defense Acquisition Management Information Retrieval (DAMIR) for programs (e.g., major defense acquisition programs [MDAPs], acquisition category II [ACATII] programs) with milestones, costs, schedules and performance data, selected acquisition reports (SAR), acquisition strategy reports (ASR), the systems engineering plans (SEP), the test & evaluation master plans (TEMP), and the defense acquisition executive summary (DAES), among others.

The major advantage of using LLA is to apply automation to reveal and depict—to decision-makers—the correlations, associations, and program gaps across all the programs in the AVP over many years. This enables strategic understanding of data gaps and potential

trends, and can inform managers what areas might be highly risky for a program and how resource and big data management might affect the desired return on investment (ROI) among projects.

Introduction

It is critical that the Department of Defense (DoD)-wide acquisition community be able to access authoritative and accurate data services for decision-making. The Acquisition Visibility Portal (AVP) was such a data service that achieved this purpose by interfacing with program elements and warfighter requirements via a Defense Technical Information Center (DTIC) interface (program elements [PEs], see [http://www.dtic.mil/descriptivesum/]; and requirements, see [http://www.dtic.mil/doctrine/]). The AVP also included an interface to Defense Acquisition Management Information Retrieval (DAMIR; http://www.acq.osd.mil/damir/) to access large, detailed collections of information such as milestones, costs, schedules, and performance data of selected acquisition reports (SAR) and acquisition Strategy Reports (ASR), among others, regarding Major Defense Acquisition Programs (MDAPs) and Acquisition Category II (ACATII) program data. The AVP also provided automatic methodologies to systematically improve understanding of the quality of the data.

In the past, we have explored an analytic and visualization tool named Lexical Link Analysis (LLA), which we applied to various areas of acquisition research, for example, to link warfighter requirements with the acquisition programs and program elements (Gallup, MacKinnon, Zhao, Robey, & Odell, 2009; Zhao, Gallup, & MacKinnon, 2010, 2011a, 2011b, 2011c, 2011d, 2012a, 2012b, 2013; Zhao, Brutzman, & MacKinnon 2013). Recently, we have started to explore how LLA can help detect data quality, inconsistency, gaps, or bad data among categories of data by automatically discovering new patterns that were previously unknown and by identifying data dependencies that might be indicators for program or investment performances.

For example, we observed that very little of the information generated for program oversight is amenable to effective analysis. Every major acquisition program's milestone review generates volumes of information, which the Office of the Secretary of Defense (OSD) staff is supposed to review to determine if the program is properly prepared for the next milestone. Although acquisition professionals and decision-makers at OSD are beginning to compile these artifacts centrally to facilitate review and analysis, at present the only way to analyze the information in these artifacts is to read them. With limitations on staffing, little time is available to thoroughly review these artifacts. Moreover, each functional community is required to review only the particular document for which it is responsible. For example, the systems engineering community typically only examines the systems engineering plans (SEP), the test and evaluation community looks only at the test & evaluation master plans (TEMP), and the acquisition community looks at the acquisition strategy reports (ASR). Rarely do any of these stakeholders review multiple reports or jointly discuss them to determine if they are mutually consistent and consider inconsistencies that might indicate programmatic risk. There is even less incentive and opportunity to look for external factors that would potentially invalidate the assumptions that underpin the basic cost, schedule, and performance targets of each program's execution.

These milestone documents, though distinct, should be mutually consistent. For example, they all describe the same program, so should use consistent naming conventions and concepts. Divergent naming conventions may indicate that the documents were developed in isolation. This would be a concern because there are meaningful linkages between these reports such that a capability defined in the acquisition strategy, should be

elaborated in the systems engineering plan; the testing of which should be described in the TEMP. Inconsistencies among these documents may reflect a risk to the program.

Motivated by these situations, we applied LLA as one of automatic tools to examine large collections of artifacts for many programs in various categories across the acquisition and engineering communities. By using LLA, one can learn from the actual data to see how the common concepts are expressed in different artifacts and communities. Overlaying the concepts for each category of artifacts to conduct a pair-wise comparison exposes significant disconnections between them. The automatic discovery of the disconnection or gaps could be fed back to the human analysts or decision-makers to perform further investigations.

In this paper, we demonstrate a set of comprehensive LLA analysis reports and visualizations generated automatically for a given program using multiple categories of program data as data sources. These reports and visualizations revealed that there are data correlations and gaps among at least eight data sources. These correlations and gaps could form the basis for further inquiry or future reconciliation of the expectations (e.g., acquisition strategy) and realities (e.g., engineering feasibility) from various communities for a same MDAP program. LLA is able to discover in detail where the gaps and inconsistencies of the data across multiple data sources, which lead to identify and offer specific and productive directions for further examination regarding why gaps occur and where they exist.

Methodology

Detecting Data Consensus and Gaps in the AVP Data Sources

To detect the data gaps between two categories of information, LLA compares the milestone artifacts for a given program from one category to another, for example, comparing the ASRs with the SEPs for program “X” at Milestone B. These comparisons, reported as themes, features, and word pairs, may help cue a decision-maker’s attention to the potential issues and consider specific and productive directions for further scrutiny.

To illustrate the methodology, we first manually extracted a sample Navy ship-building program as a representative of Major Defense Acquisition Programs (MDAPs) from the AVP with sources including various artifacts, for example, Acquisition Strategy Reports (ASR), Selected Acquisition Reports (SAR), Defense Acquisition Executive Summaries (DAES), Certification Milestone B, Acquisition Decision Memorandums (ADM), Acquisition Program Baselines (APB), Technology Readiness Assessment (TRA), Test & Evaluation Master Plans (TEMP), and Systems Engineering Plans (SEP).

When using LLA to compare two data sources, for example, comparing ASR and TEMP, we asked the question, “What are the features or clusters of features (e.g., themes) discussed in ASR but not discussed in TEMP?” If found, there might be various reasons to explain the discrepancies. For example, if features appear only in ASR but not in TEMP, it could be a gap because of (1) a data quality issue (e.g., a mishandling of data by AVP), (2) a data classification issue (e.g., unclassified data vs. classified data), or (3) a real requirement gap (i.e., a concept required by acquisition for which no engineering feasibility document or blueprint can be located). These types of information, if detected earlier, could provide decision-makers with the basis to make earlier amendments, thereby reducing program risks and future costs.

It is also noted that some inconsistencies might be related to the distinctive functional perspective of each report. For example, one would expect a higher occurrence of concepts related to acquisition strategy: that is, contracts, budget, funding, competition., etc., whereas a Systems Engineering Plan would have a higher occurrence of concepts related to

architecture, systems, integration, interface, specifications, and so forth. A lack of consistency of these functionally-specific terms from one artifact to another would not necessarily represent increased risk.

In this report, we report on the overall comparisons of these data sources. The FOUO content is not included in the main body of the report. These questions can be answered by human analysts if they have enough time to go through the piles of artifacts one by one and mark the differences. The advantage of using LLA is to automate the process and thereby provide indepth initial screening prior to human analysis.

Lexical Link Analysis (LLA) Method

A review of LLA can be found in Appendix B to provide a basis for how this analysis is accomplished.

Research Results

Data Access

This year we experienced improved data access to the following portals:

- Acquisition Visibility/DMAIR Portal (https://ebiz.acq.osd.mil/DAMIR/PortalMain/DamirPortal.aspx)
- Acquisition Visibility/AIR Portal (https://www.dodtechipedia.mil/dodc/plugins/AIR/airdocuments.action)
- Acquipedia (https://dap.dau.mil/acquipedia). A screenshot of this data source is shown in Figure 1.

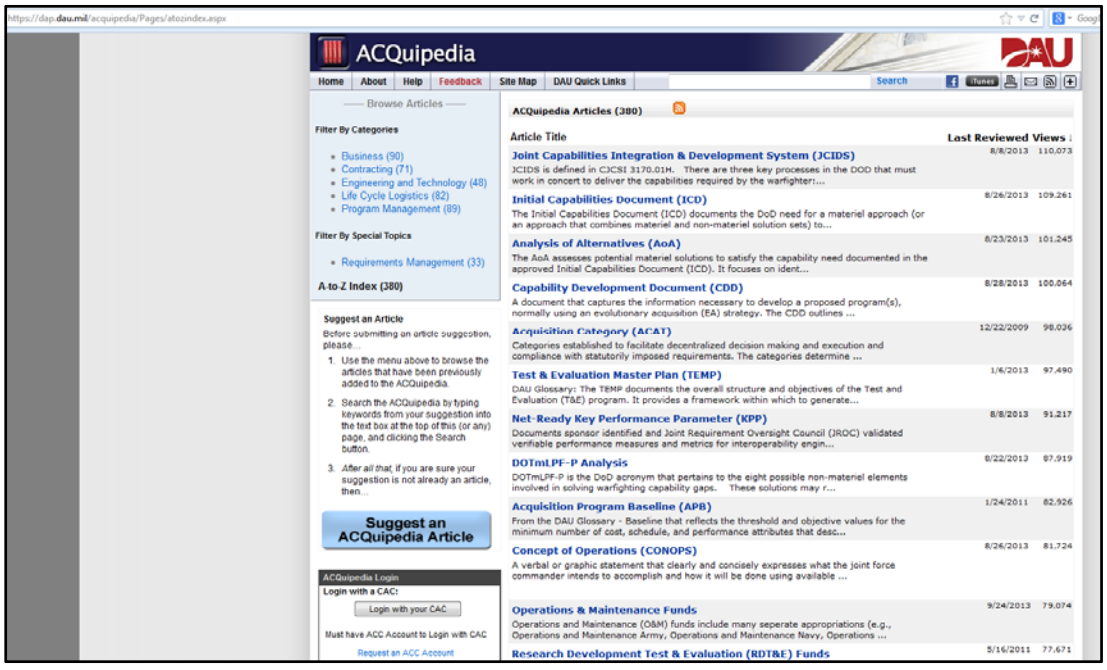


Figure 1. Acquipedia Data Source

Automatic Data Streaming

Our automated data analysis efforts are still in the process of development. Although as individuals, the researchers in this project are able to access some individual programs in

the AVP following the proper request processes, large-scale streaming these data to a tool residing outside AVP proves difficult due to policy issues. For example, according to the AIR help desk, “Access to the documents in AIR is controlled by each individual who uploads the documents; therefore, if one wants access to a specific document that you do not currently have access to, one has to select the little envelope icon (in the search results page) to send an email to the document uploader, requesting access to that document. It is up to that person to grant or deny access to that document.”

Therefore, we focused on following the current DAMIR/AIR data access policies by sending requests program by program and file by file to get samples of AVP. If the LLA results are proven useful to the analysts and decision makers, the LLA tool can be installed inside the AVP so that it is close to the data rather than to request access then download each data set.

We tested the process for one ship-building program. Data was downloaded with documents from the following nine sources:

1. TEMP: Test & Evaluation Master Plan
2. SEP: Systems Engineering Plan
3. ASR: Acquisition Strategy Report
4. SAR: Selected Acquisition Report
5. DAES: Defense Acquisition Executive Summary
6. ADM: Milestone B 2366b Certification Acquisition Decision Memorandum
7. APB: Acquisition Program Baseline
8. TRA: Technology Readiness Assessment
9. LCSP: Life Cycle Sustainment Plan

Many of these documents are for official use only, and the SEP documents for the ship-building program studied in this paper are still in progress to be extracted at the time of this paper. Therefore, we only include eight data sources in the following discussions.

Conversely, we were able to successfully—and automatically—download publically accessible Acquipedia data into the LLA tool using the crawler technology including 380 html pages, which serves as an online encyclopedia of common defense acquisition topics. Each topic is identified as an article; each article contains a definition, a brief narrative that provides context, and links to the most pertinent policy, guidance, tools, practices, and training that further augment understanding and expand depth. Since it contains standard terminologies for common defense acquisition topics, we are in the process of using the data as a separate data source for supervised learning data to train LLA to improve the understanding of context-dependent meaning.

Automatic Generation of Reports and Visualizations Showing the Relations of the Data Sources

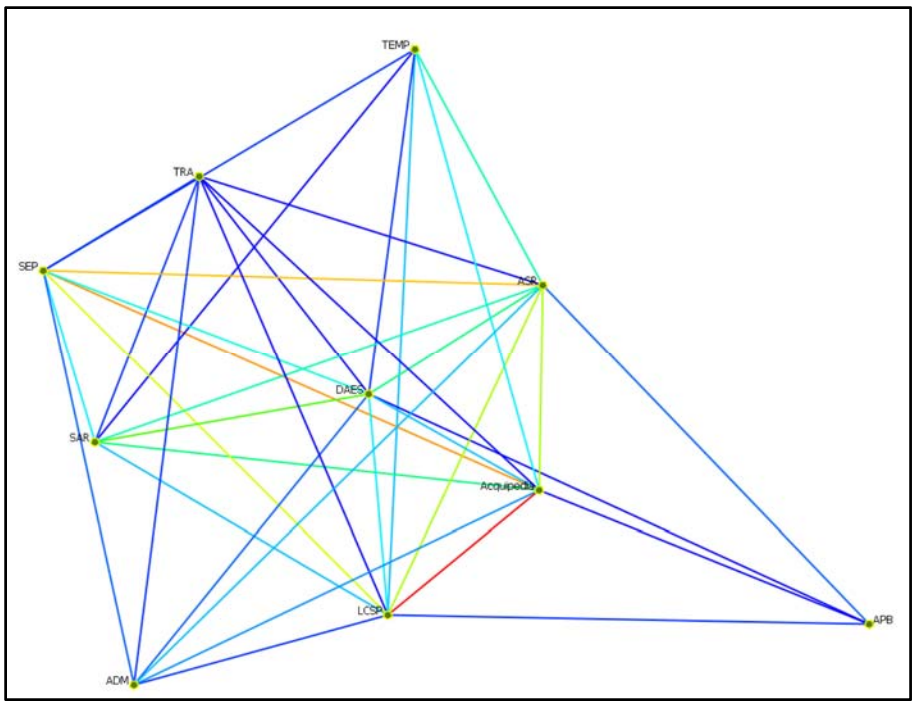
For the one ship-building program we have downloaded the eight data sources from AVP (DAMIR and AIR) as we explained, our objectives were to compare the eight data sources to see similarities and differences. In order to answer the question such as “What are the features or clusters of features (e.g., themes) discussed in ASR but not discussed in LCSP?” for every pair of data sources in comparison, we focused on the automatic generations of the following reports given the data for each source.

1. Match Matrix Report:
   Table 1 shows match scores, i.e., number of word pairs matched among any of two data sources in the eight data sources and correlations among these categories. A match score for a data source is the total number of matched features (e.g., LLA word pairs) and a uniqueness score is the total number of unique word pairs are unique to the source. A correlation is normalized using the match score and uniqueness score. For example, a correlation 0.15 between ASR and Acquipedia is computed as = $499/(\sqrt{(943+3944)} \times \sqrt{(832+1415)})$.

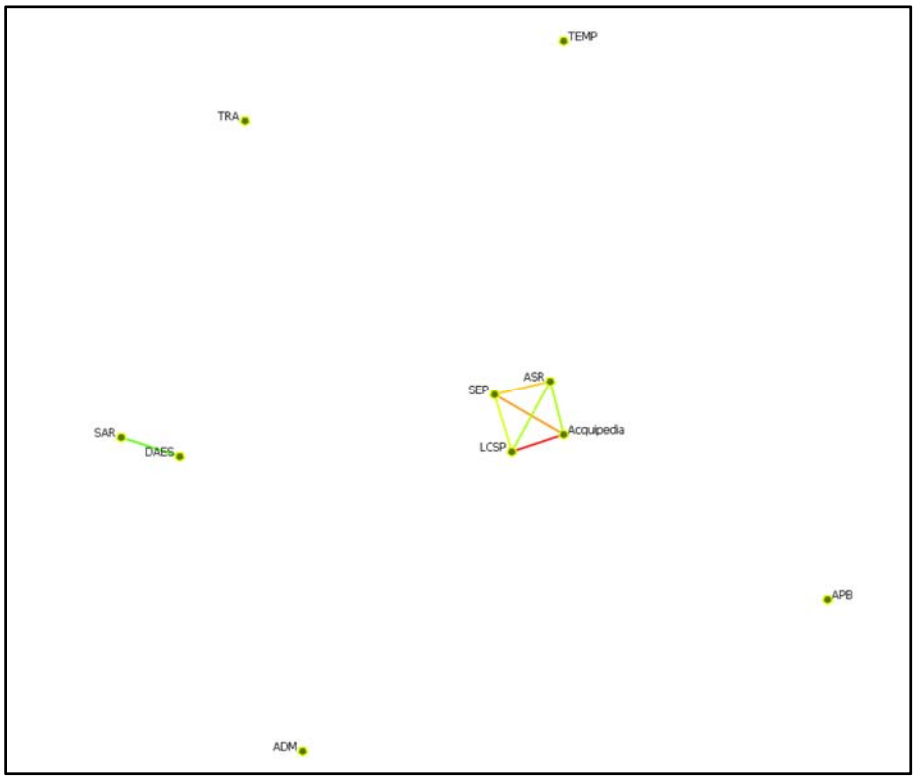
Table 1. Match Scores and Correlations for the Eight Data Sources

		Match Score	Acquipedia	ASR	LCSP	SEP	DAES	TEMP	ADM	SAR	APB	TRA	Uniqueness Score
1	Acquipedia	943.00	_	499.00(0.15)	521.00(0.22)	292.00(0.19)	86.00(0.05)	82.00(0.06)	25.00(0.04)	51.00(0.09)	3.00(0.01)	5.00(0.01)	3944.00
2	ASR	832.00	499.00(0.15)	_	251.00(0.15)	194.00(0.18)	97.00(0.09)	78.00(0.08)	18.00(0.05)	30.00(0.08)	5.00(0.03)	4.00(0.01)	1415.00
3	LCSP	513.00	521.00(0.22)	251.00(0.15)	_	119.00(0.16)	45.00(0.06)	34.00(0.05)	6.00(0.02)	15.00(0.05)	2.00(0.02)	3.00(0.01)	657.00
4	SEP	239.00	292.00(0.19)	194.00(0.18)	119.00(0.16)	_	34.00(0.07)	11.00(0.02)	6.00(0.03)	10.00(0.06)	0.00(0.00)	3.00(0.02)	253.00
5	DAES	175.00	86.00(0.05)	97.00(0.09)	45.00(0.06)	34.00(0.07)	_	11.00(0.02)	6.00(0.03)	25.00(0.13)	1.00(0.01)	1.00(0.01)	368.00
6	TEMP	86.00	82.00(0.06)	78.00(0.08)	34.00(0.05)	11.00(0.02)	11.00(0.02)	_	0.00(0.00)	2.00(0.01)	0.00(0.00)	0.00(0.00)	353.00
7	ADM	46.00	25.00(0.04)	18.00(0.05)	6.00(0.02)	6.00(0.03)	6.00(0.03)	0.00(0.00)	_	0.00(0.00)	0.00(0.00)	1.00(0.02)	20.00
8	SAR	40.00	51.00(0.09)	30.00(0.08)	15.00(0.05)	10.00(0.06)	25.00(0.13)	2.00(0.01)	0.00(0.00)	_	0.00(0.00)	1.00(0.02)	25.00
9	APB	8.00	3.00(0.01)	5.00(0.03)	2.00(0.02)	0.00(0.00)	1.00(0.01)	0.00(0.00)	0.00(0.00)	0.00(0.00)	_	0.00(0.00)	7.00
10	TRA	8.00	5.00(0.01)	4.00(0.01)	3.00(0.01)	3.00(0.02)	1.00(0.01)	0.00(0.00)	1.00(0.02)	1.00(0.02)	0.00(0.00)	_	48.00

2. Visualization of Correlations Among Data Sources:
   Figure 2 (a) shows a network using correlations of the eight data souces in Table 1. Figure 2 (b) shows the network connections with the correlations > 0.1 in (a). In this example, data sources LCSP, ASR and SEP have the highest correlations with Acquipedia and with each other, indicating ASR, LCSP and SEP may use more standardized vocubarlies and terminologies than other data sources and are also correlated with each other much more than with the other sources. SAR and DAES are also correlated with each other more with each other.



(a)



(b)

Figure 2. (a) A Network Depiction of Correlations of the Eight Data Sources in Table 1; (b) The Correlations > 0.1 in (a)

3. Match Matrix Drill-down Report:
   Figure 3 shows part of the drill-down capabilities for the list of the matched terms between Aaquipedia and all other data sources. The terms are listed according the bi-gram frequencies and probabilities. The hyperlinks under these terms lead to a search and drill-down report to see the locations of the terms used in the documents. The related concepts can be also visualized.

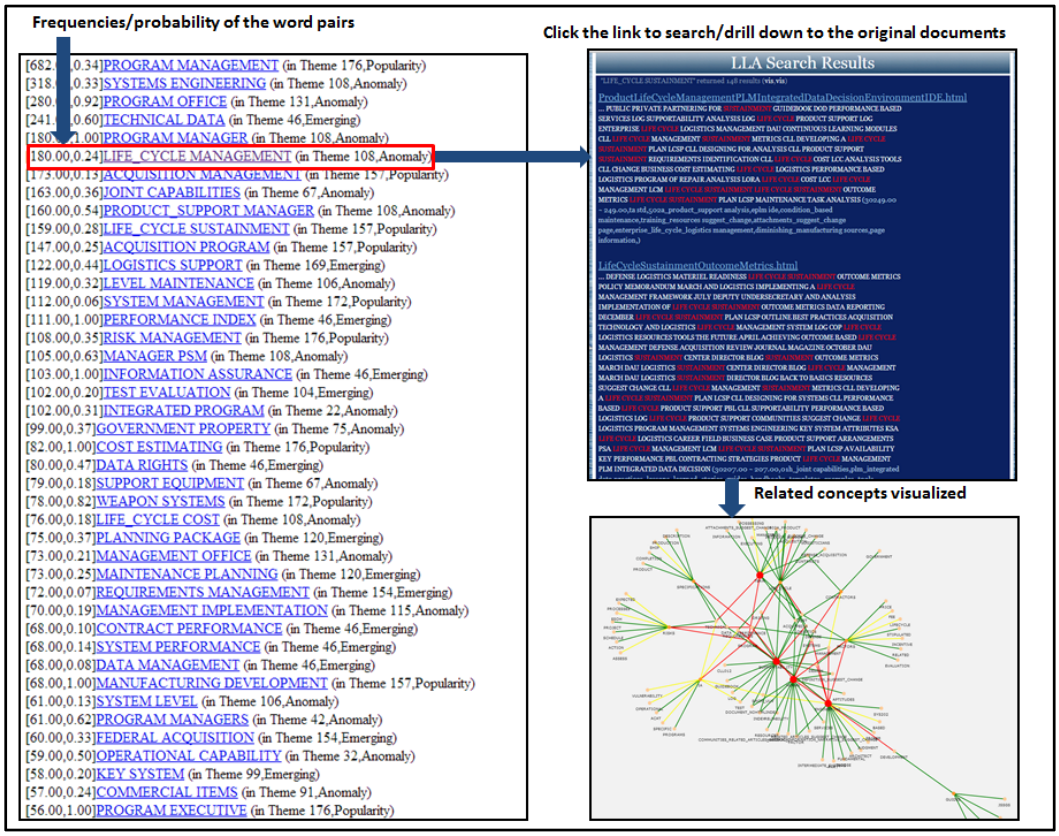


Figure 3. Drill-Down Capabilities for Data Source Acquipedia

4. Discovered Theme Report:
   Table 2 shows the list of themes (clusters of word pairs) when comparing two data sources, e.g., ASR and Acquipedia. We report here the following statistics in Theme 157(P), 176(P), and so on.

- Number of unique features for Source 1 (e.g., ASR)
- Number of unique features for Source 2 (e.g., Acquipedia)
- Matched features for both sources
- Correlation of two sources (or consensus rate), i.e., percentage of the features that are matched
- Gap rate: percentage of the features that are not matched

These statistics show in which areas (reflected in the themes) the two data sources agree (consensus, e.g., 46[E]) and disagree (gap,e.g., 167[P]) the most. Clicking on the Visualization column of 46(E) and 167(P) lead to the visualizations of two areas where consensus and gap took place.

Table 2. List of Themes Comparing Two Data Sources (e.g., ASR and Acquipedia)

Theme Id	# of Unique Features for Source ASR	# of Unique Features for Source Acquipedia	# of Matched Features	Consensus Rate(Correlation)	Gap Rate	Visualization
157(P)	23	206	34	0.13	0.87	157(P)
176(P)	42	138	47	0.21	0.79	176(P)
167(P)	23	222	16	0.06	0.94	167(P)
172(P)	38	94	23	0.15	0.85	172(P)
169(E)	27	119	31	0.18	0.82	169(E)
46(E)	15	117	46	0.26	0.74	46(E)
104(E)	26	64	12	0.12	0.88	104(E)
120(E)	30	106	27	0.17	0.83	120(E)
111(E)	14	73	8	0.08	0.92	111(E)
154(E)	11	94	21	0.17	0.83	154(E)
99(E)	22	86	27	0.20	0.80	99(E)
141(E)	19	65	7	0.08	0.92	141(E)
179(A)	29	87	27	0.19	0.81	179(A)
124(A)	17	54	10	0.12	0.88	124(A)
106(A)	28	72	16	0.14	0.86	106(A)
67(A)	20	59	23	0.23	0.77	67(A)
108(A)	20	86	22	0.17	0.83	108(A)
32(A)	11	61	6	0.08	0.92	32(A)
149(A)	10	81	11	0.11	0.89	149(A)
22(A)	21	68	8	0.08	0.92	22(A)
166(A)	16	81	10	0.09	0.91	166(A)
131(A)	7	80	6	0.06	0.94	131(A)
115(A)	12	106	3	0.02	0.98	115(A)
66(A)	10	59	4	0.05	0.95	66(A)
68(A)	16	58	16	0.18	0.82	68(A)
145(A)	23	70	7	0.07	0.93	145(A)

5. Discovered Consensus and Gap Visualization Among Data Sources: Figure 4 shows a visualization of comparison of two sources, e.g., the data source LCSP and ASR for the same ship-building program in an effort to discover the consensus and gaps among the multiple data sources for the same program. Red nodes show the most “central” nodes, used as keywords to summarize this theme, i.e., “Program, Cost, Test, Additional.” Red Links show word pairs shared by the two sources. Yellow Links show the unique word pairs from one source (e.g., LCSP), and green links show word pairs from the other source (e.g., ASR). The actual word pairs are eliminated here since the content is for official use only. The consensus rate for this theme is 29%, i.e., 29% of word pairs or features are in agreement, 71% of word pairs are not. As one can see, ASR focuses on “Test” and LCSP does not.

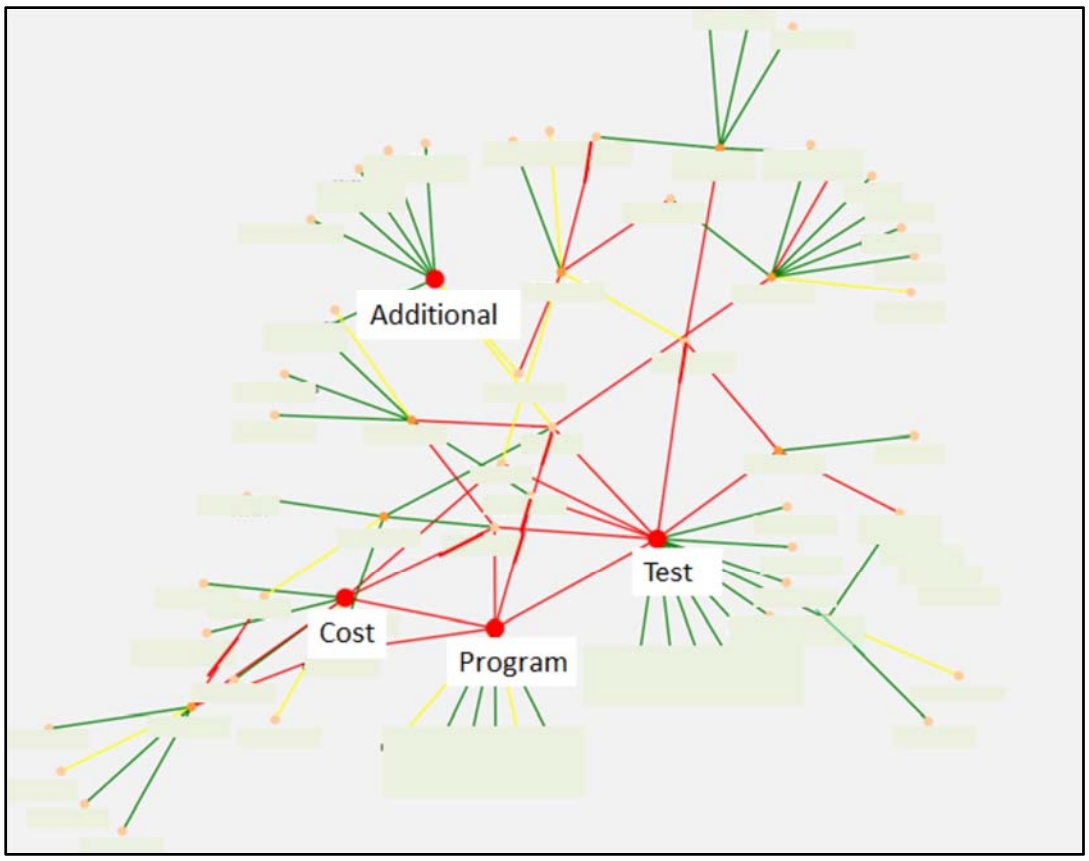


Figure 4. Visualizations of Comparison of Two Sources

6. Discovered Consensus and Gap Report among Data Sources:
   Figure 5 shows a report listing of word pairs matched and unique in the two data sources (e.g., LCSP and ASR) for the theme in Figure 4. The actual word pairs are eliminated here since the content is for official use only. Numbers in the brackets are the bi-gram frequencies and probabilites respectively.

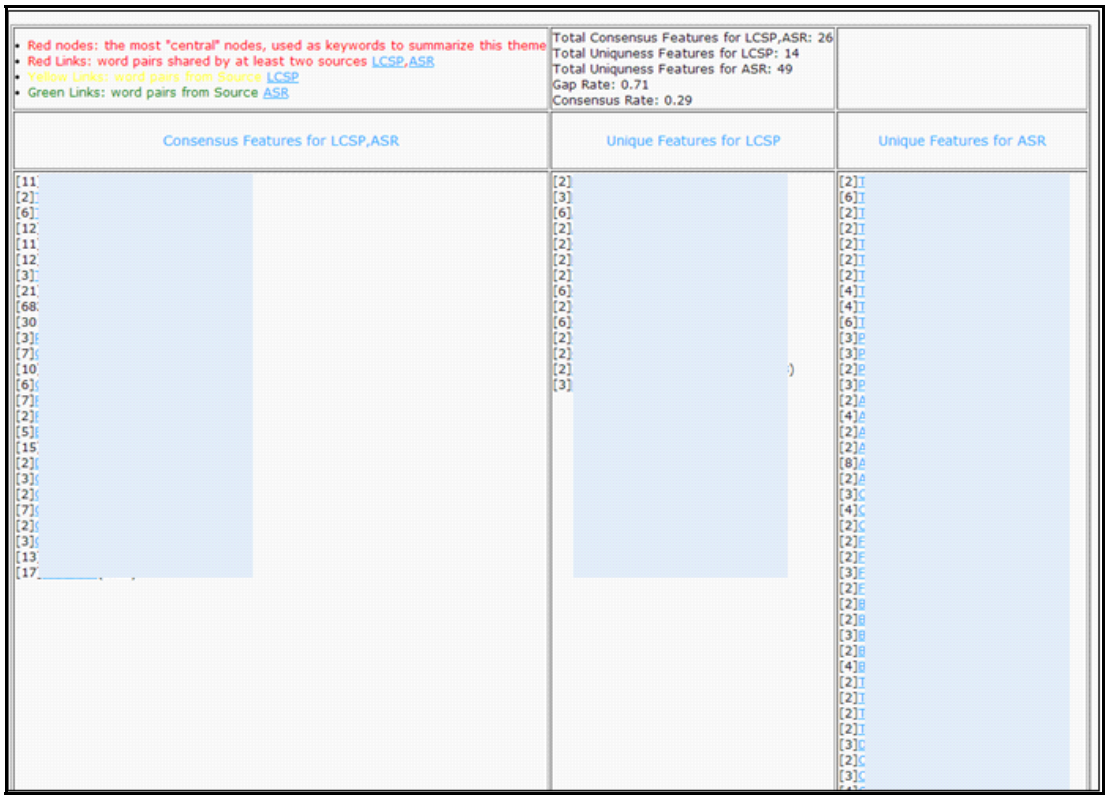


Figure 5. List of Word Pairs Matched and Unique in Two Data Sources

Acquipedia

LLA generated 910 word pairs (out of 5,062 total word pairs) from Acquipedia that are matched from this program's seven data sources. The complete matched list can be found in Appendix A, which can be considered as a set of standardized vocabularies and terminologies used by this ship-building program. Among the 910 matched features, 39% are anomalous features, 35% are emerging features and 25% are popular features.

Table 3. Breakdown of Matched Features

	Percentage	Number of Features
Anomalous features	39%	358
Emerging features	35%	322
Popular features	25%	230

The outputs of LLA are then divided into three types:

- Popular or Normal (P): themes containing the highest number of mutually connected word pairs. The themes represent the main topics in a corpus at the time. They may be also regarded as *less interesting* because they are already in the public consensus and awareness, therefore, less room for growth.
- Emerging (E): themes containing the medium number of mutually connected word pairs, these themes may grow to popular over time as we show later in the examples.

- Anomalous (A): themes containing the lowest number of mutually connected word pairs. These themes may be off-topics which may seem they do not belong here compared to other ones and may be interesting for further investigation.

This validates that our previous observations that anomalous and emerging features are more interesting because they are used in the documents regarding an actual ship-building program.

Planned Future Work

Future investigations are planned as the following additional studies:

- Continue working with Sponsors and AVP analysts to develop a process to generate the LLA reports and visualizations for any given program in AVP.
- Study the program interactions for a portfolio of programs. For example, one of the biggest risk factors in defense acquisition is the unanticipated effects of program interactions. Some current work exists toward identifying interdependence among programs within a system of systems (SoS; Dahmann et al., 2005). Yet, more broadly, and as a result of required joint capabilities, portfolios often include program interdependencies and SoS effects. Ultimately, the current "program-centric" acquisition paradigm is increasingly ill-suited to identify and address program risks that arise outside of program boundaries. We will select a portfolio of programs and focuses on one type of data sources, for example ASR to see if LLA can depict the interaction risks.
- Use Acquipedia as a separate data source, which contains standard terminologies for common defense acquisition topics, for supervised learning data to train LLA to improve the understanding of context-dependent meaning.

Conclusion

In this paper, we demonstrate a set of comprehensive LLA analysis reports and visualizations generated automatically for a given AVP program using multiple categories of program data as data sources. These reports and visualizations reveal that there are data correlations and gaps among at least eight data sources. These correlations and gaps could form the basis for further inquiry or future reconciliation of the expectations (e.g., acquisition strategy) and realities (e.g., engineering feasibility) from various communities for a same MDAP program. LLA is able to discover in detail where the gaps and inconsistencies of the data across multiple data sources reside, which in turn, can lead to the identification of future specific and productive directions for further examination regarding why gaps occur and where they exist.

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Appendix A: Word Pairs in Acquipedia Matched in a Ship-building Program

[682.00,0.34]PROGRAM MANAGEMENT (in Theme 176,Popularity)
[318.00,0.33]SYSTEMS ENGINEERING (in Theme 108,Anomaly)
[280.00,0.92]PROGRAM OFFICE (in Theme 131,Anomaly)
[241.00,0.60]TECHNICAL DATA (in Theme 46,Emerging)
[180.00,1.00]PROGRAM MANAGER (in Theme 108,Anomaly)
[180.00,0.24]LIFE_CYCLE MANAGEMENT (in Theme 108,Anomaly)
[173.00,0.13]ACQUISITION MANAGEMENT (in Theme 157,Popularity)
[163.00,0.36]JOINT CAPABILITIES (in Theme 67,Anomaly)
[160.00,0.54]PRODUCT_SUPPORT MANAGER (in Theme 108,Anomaly)
[159.00,0.28]LIFE_CYCLE SUSTAINMENT (in Theme 157,Popularity)
[147.00,0.25]ACQUISITION PROGRAM (in Theme 157,Popularity)
[122.00,0.44]LOGISTICS SUPPORT (in Theme 169,Emerging)
[119.00,0.32]LEVEL MAINTENANCE (in Theme 106,Anomaly)
[112.00,0.06]SYSTEM MANAGEMENT (in Theme 172,Popularity)
[111.00,1.00]PERFORMANCE INDEX (in Theme 46,Emerging)
[108.00,0.35]RISK MANAGEMENT (in Theme 176,Popularity)
[105.00,0.63]MANAGER PSM (in Theme 108,Anomaly)
[103.00,1.00]INFORMATION ASSURANCE (in Theme 46,Emerging)
[102.00,0.20]TEST EVALUATION (in Theme 104,Emerging)
[102.00,0.31]INTEGRATED PROGRAM (in Theme 22,Anomaly)
[99.00,0.37]GOVERNMENT PROPERTY (in Theme 75,Anomaly)
[82.00,1.00]COST ESTIMATING (in Theme 176,Popularity)
[80.00,0.47]DATA RIGHTS (in Theme 46,Emerging)
[79.00,0.18]SUPPORT EQUIPMENT (in Theme 67,Anomaly)
[78.00,0.82]WEAPON SYSTEMS (in Theme 172,Popularity)
[76.00,0.18]LIFE_CYCLE COST (in Theme 108,Anomaly)
[75.00,0.37]PLANNING PACKAGE (in Theme 120,Emerging)
[73.00,0.21]MANAGEMENT OFFICE (in Theme 131,Anomaly)
[73.00,0.25]MAINTENANCE PLANNING (in Theme 120,Emerging)
[72.00,0.07]REQUIREMENTS MANAGEMENT (in Theme 154,Emerging)
[70.00,0.19]MANAGEMENT IMPLEMENTATION (in Theme 115,Anomaly)
[68.00,0.10]CONTRACT PERFORMANCE (in Theme 46,Emerging)
[68.00,0.14]SYSTEM PERFORMANCE (in Theme 46,Emerging)
[68.00,0.08]DATA MANAGEMENT (in Theme 46,Emerging)
[68.00,1.00]MANUFACTURING DEVELOPMENT (in Theme 157,Popularity)
[61.00,0.13]SYSTEM LEVEL (in Theme 106,Anomaly)
[61.00,0.62]PROGRAM MANAGERS (in Theme 42,Anomaly)
[60.00,0.33]FEDERAL ACQUISITION (in Theme 154,Emerging)
[59.00,0.50]OPERATIONAL CAPABILITY (in Theme 32,Anomaly)
[58.00,0.20]KEY SYSTEM (in Theme 99,Emerging)
[57.00,0.24]COMMERCIAL ITEMS (in Theme 91,Anomaly)
[56.00,1.00]PROGRAM EXECUTIVE (in Theme 176,Popularity)
[56.00,0.16]SYSTEM DESIGN (in Theme 99,Emerging)
[55.00,0.20]IMPLEMENTATION GUIDE (in Theme 115,Anomaly)
[53.00,0.16]SOFTWARE SUPPORT (in Theme 169,Emerging)
[52.00,0.07]ACQUISITION PROCESS (in Theme 157,Popularity)
[49.00,0.42]COST EFFECTIVE (in Theme 99,Emerging)
[49.00,0.16]CONTRACT BUDGET (in Theme 176,Popularity)
[49.00,0.34]LIFE_CYCLE SUPPORT (in Theme 108,Anomaly)
[48.00,0.32]INTERFACE DESIGN (in Theme 99,Emerging)
[47.00,0.67]PROGRAM BASELINE (in Theme 176,Popularity)
[47.00,1.00]ACQUISITION PROGRAMS (in Theme 120,Emerging)
[46.00,1.00]ACQUISITION TECHNOLOGY (in Theme 157,Popularity)
[46.00,0.50]DOD COMPONENT (in Theme 157,Popularity)
[46.00,0.04]CONTRACT MANAGEMENT (in Theme 167,Popularity)
[45.00,0.50]SUSTAINMENT METRICS (in Theme 157,Popularity)
[45.00,0.35]HUMAN SYSTEMS (in Theme 108,Anomaly)
[44.00,0.08]SYSTEM SUSTAINMENT (in Theme 157,Popularity)
[43.00,0.37]INDEPENDENT LOGISTICS (in Theme 176,Popularity)
[42.00,0.37]INTEGRATED TEST (in Theme 22,Anomaly)
[41.00,0.33]CAPABILITY DEVELOPMENT (in Theme 32,Anomaly)
[39.00,0.50]DEVELOPMENTAL TEST (in Theme 179,Anomaly)
[39.00,0.18]INFORMATION SYSTEM (in Theme 46,Emerging)
[38.00,0.44]RELIABILITY MAINTAINABILITY (in Theme 153,Anomaly)
[38.00,0.40]INVENTORY CONTROL (in Theme 172,Popularity)
[36.00,0.03]INFORMATION SUPPORT (in Theme 46,Emerging)
[36.00,0.40]JOINT INTEROPERABILITY (in Theme 70,Anomaly)
[35.00,0.02]ACQUISITION DOD (in Theme 157,Popularity)
[35.00,0.05]TECHNICAL PERFORMANCE (in Theme 46,Emerging)
[35.00,0.17]MANAGEMENT MODEL (in Theme 179,Anomaly)

[34.00,0.05]LIFE_CYCLE SYSTEM (in Theme 108,Anomaly)
[34.00,0.17]INITIAL CAPABILITIES (in Theme 106,Anomaly)
[34.00,0.54]PERFORMANCE SPECIFICATION (in Theme 172,Popularity)
[34.00,0.17]DEFENSE PROGRAM (in Theme 124,Anomaly)
[33.00,0.13]INTEGRATION DEVELOPMENT (in Theme 42,Anomaly)
[33.00,0.20]PROGRAM BUDGET (in Theme 176,Popularity)
[33.00,0.50]ACQUISITION EXECUTIVE (in Theme 176,Popularity)
[32.00,1.00]FAILURE MODES (in Theme 68,Anomaly)
[32.00,0.09]SUPPORT REQUIREMENTS (in Theme 154,Emerging)
[32.00,0.67]ACQUISITION DECISION (in Theme 149,Anomaly)
[32.00,0.60]COST ESTIMATES (in Theme 176,Popularity)
[31.00,0.03]DEVELOPMENT PROCESS (in Theme 157,Popularity)
[30.00,0.02]SUPPORT SYSTEM (in Theme 169,Emerging)
[30.00,1.00]CHANGE PROPOSALS (in Theme 21,Anomaly)
[30.00,0.06]TRAINING SUPPORT (in Theme 179,Anomaly)
[30.00,0.16]PROGRAM OBJECTIVES (in Theme 176,Popularity)
[30.00,0.03]SYSTEMS PERFORMANCE (in Theme 172,Popularity)
[29.00,0.24]TARGET COST (in Theme 176,Popularity)
[29.00,0.40]LOGISTICS AGENCY (in Theme 154,Emerging)
[29.00,0.13]MANAGEMENT PROCESSES (in Theme 99,Emerging)
[29.00,0.33]ACQUISITION SYSTEM (in Theme 157,Popularity)
[29.00,1.00]QUALITY ASSURANCE (in Theme 46,Emerging)
[29.00,1.00]DEVELOPMENTAL TESTING (in Theme 179,Anomaly)
[29.00,0.33]TEST EVENTS (in Theme 179,Anomaly)
[29.00,0.05]OPERATIONAL REQUIREMENTS (in Theme 46,Emerging)
[28.00,1.00]MANPOWER PERSONNEL (in Theme 106,Anomaly)
[28.00,0.07]SUPPORT STRATEGY (in Theme 166,Anomaly)
[28.00,0.12]CRITICAL DESIGN (in Theme 68,Anomaly)
[27.00,0.21]CONTROL SYSTEM (in Theme 172,Popularity)
[27.00,0.33]REPAIR PARTS (in Theme 141,Emerging)
[27.00,0.10]PRODUCT LIFE_CYCLE (in Theme 169,Emerging)
[27.00,0.50]DEFENSE OSD (in Theme 166,Anomaly)
[27.00,0.03]INFORMATION SYSTEMS (in Theme 46,Emerging)
[27.00,1.00]KEY INTERFACE (in Theme 99,Emerging)
[27.00,0.11]PERFORMANCE OBJECTIVES (in Theme 176,Popularity)
[27.00,0.23]TEST PLANS (in Theme 172,Popularity)
[27.00,0.10]JOINT OPERATIONS (in Theme 169,Emerging)
[26.00,0.10]SERVICE SUPPORT (in Theme 157,Popularity)
[26.00,1.00]STRATEGIC GUIDANCE (in Theme 75,Anomaly)
[26.00,0.95]MATERIAL SHORTAGES (in Theme 99,Emerging)
[26.00,0.05]MAINTENANCE SUPPORT (in Theme 169,Emerging)
[26.00,0.04]ENGINEERING PROCESS (in Theme 157,Popularity)
[26.00,0.16]SUSTAINMENT REQUIREMENTS (in Theme 157,Popularity)
[25.00,0.02]SYSTEM REQUIREMENTS (in Theme 154,Emerging)
[25.00,0.07]RISK ASSESSMENT (in Theme 176,Popularity)
[25.00,0.03]MANAGEMENT PROCESS (in Theme 157,Popularity)
[25.00,0.18]TEST RESULTS (in Theme 52,Anomaly)
[24.00,0.29]DEFENSE FEDERAL (in Theme 154,Emerging)
[24.00,0.50]SUPPORT COSTS (in Theme 120,Emerging)
[24.00,0.15]PRODUCT_SUPPORT STRATEGIES (in Theme 157,Popularity)
[24.00,0.03]MISSION SYSTEM (in Theme 120,Emerging)
[24.00,0.27]HUMAN FACTORS (in Theme 108,Anomaly)
[24.00,0.12]CONTRACTOR SUPPORT (in Theme 42,Anomaly)
[23.00,0.05]ACQUISITION LIFE_CYCLE (in Theme 108,Anomaly)
[23.00,0.10]SECTION CHAPTER (in Theme 167,Popularity)
[22.00,0.07]TECHNICAL SUPPORT (in Theme 46,Emerging)
[22.00,0.11]PROGRAM EVALUATION (in Theme 104,Emerging)
[22.00,0.07]MANAGEMENT INFORMATION (in Theme 46,Emerging)
[21.00,0.08]PRODUCT_SUPPORT ELEMENTS (in Theme 111,Emerging)
[21.00,0.55]TECHNICAL MANUAL (in Theme 46,Emerging)
[21.00,0.03]TECHNICAL REQUIREMENTS (in Theme 46,Emerging)
[21.00,0.04]PROGRAM COST (in Theme 176,Popularity)
[21.00,0.07]OPERATIONS SUPPORT (in Theme 169,Emerging)
[21.00,0.20]DESIGN SERVICES (in Theme 179,Anomaly)
[21.00,0.02]GOVERNMENT CONTRACT (in Theme 75,Anomaly)
[21.00,0.08]SYSTEM EQUIPMENT (in Theme 67,Anomaly)
[21.00,1.00]ACQUISITION BOARD (in Theme 157,Popularity)
[20.00,0.11]SUPPORT STRATEGIES (in Theme 157,Popularity)
[20.00,0.32]LOGISTICS CENTER (in Theme 169,Emerging)
[20.00,1.00]TITLE SECTION (in Theme 167,Popularity)
[19.00,0.03]REVIEW PROCESS (in Theme 157,Popularity)
[19.00,0.10]COMPONENT ACQUISITION (in Theme 157,Popularity)
[19.00,0.49]ANALYTICAL TOOLS (in Theme 147,Anomaly)
[19.00,0.33]LEVEL ACTIVITIES (in Theme 154,Emerging)
[19.00,0.01]COST PERFORMANCE (in Theme 176,Popularity)
[19.00,0.07]PRODUCT DATA (in Theme 169,Emerging)
[19.00,0.67]SERVICE LIFE (in Theme 157,Popularity)
[18.00,0.75]SYSTEMS EQUIPMENT (in Theme 67,Anomaly)
[18.00,0.13]FACTORS ENGINEERING (in Theme 108,Anomaly)
[18.00,0.14]PROGRAM REVIEWS (in Theme 157,Popularity)

[18.00,0.21]SUPPORT INFRASTRUCTURE (in Theme 99,Emerging)
[18.00,0.09]PROGRAM DEVELOPMENT (in Theme 124,Anomaly)
[18.00,0.02]SYSTEMS MANAGEMENT (in Theme 172,Popularity)
[18.00,0.31]MAINTENANCE PERSONNEL (in Theme 106,Anomaly)
[18.00,0.03]ASSESSMENT PROGRAM (in Theme 22,Anomaly)
[18.00,0.37]OBSOLESCENCE MANAGEMENT (in Theme 106,Anomaly)
[18.00,0.04]TRAINING SYSTEM (in Theme 179,Anomaly)
[17.00,0.33]CHANGE PROPOSAL (in Theme 21,Anomaly)
[17.00,0.25]CONTRACT MODIFICATIONS (in Theme 154,Emerging)
[17.00,0.10]PBL CONTRACT (in Theme 149,Anomaly)
[17.00,0.03]INTEGRATED SYSTEM (in Theme 22,Anomaly)
[17.00,0.13]CAPABILITIES REQUIRED (in Theme 67,Anomaly)
[17.00,0.09]ACQUISITION PHASE (in Theme 145,Anomaly)
[16.00,0.07]COST RISK (in Theme 176,Popularity)
[16.00,0.01]SUPPORT PROGRAM (in Theme 169,Emerging)
[16.00,0.14]SUPPORT ACTIVITY (in Theme 154,Emerging)
[16.00,0.10]SUPPORT ACTIVITIES (in Theme 154,Emerging)
[16.00,0.18]SYSTEMS ARCHITECTURE (in Theme 46,Emerging)
[16.00,0.08]PROGRAM INFORMATION (in Theme 46,Emerging)
[16.00,0.33]PROGRAM REQUIREMENTS (in Theme 154,Emerging)
[16.00,1.00]PERFORMANCE PARAMETER (in Theme 46,Emerging)
[16.00,1.00]MAINTENANCE TASKS (in Theme 169,Emerging)
[16.00,0.07]PERFORMANCE REQUIREMENTS (in Theme 46,Emerging)
[15.00,0.71]FIRM FIXED_PRICE (in Theme 69,Anomaly)
[15.00,0.05]MAJOR SYSTEMS (in Theme 66,Anomaly)
[15.00,1.00]CONTROL COMMUNICATIONS (in Theme 172,Popularity)
[15.00,0.02]DESIGN SYSTEMS (in Theme 99,Emerging)
[15.00,0.05]TRAINING REQUIREMENTS (in Theme 179,Anomaly)
[15.00,0.23]IMPROVEMENT PROGRAM (in Theme 120,Emerging)
[15.00,0.18]TEST EQUIPMENT (in Theme 176,Popularity)
[15.00,0.14]DETAILED DESIGN (in Theme 176,Popularity)
[15.00,1.00]MILITARY HANDBOOK (in Theme 167,Popularity)
[15.00,0.12]PERFORMANCE METRICS (in Theme 157,Popularity)
[15.00,0.06]SYSTEM CONFIGURATION (in Theme 154,Emerging)
[15.00,0.11]SYSTEM ARCHITECTURE (in Theme 46,Emerging)
[15.00,0.06]TOTAL COST (in Theme 68,Anomaly)
[15.00,0.07]CAPABILITIES DEVELOPMENT (in Theme 67,Anomaly)
[15.00,0.02]LOGISTICS REQUIREMENTS (in Theme 154,Emerging)
[15.00,0.08]COMPONENT COST (in Theme 157,Popularity)
[15.00,0.13]OPERATIONAL ISSUES (in Theme 46,Emerging)
[15.00,0.06]INTEGRATED DATA (in Theme 22,Anomaly)
[15.00,0.03]REQUIRED SUPPORT (in Theme 67,Anomaly)
[15.00,0.11]REPORTING SYSTEM (in Theme 157,Popularity)
[14.00,0.67]ORDER QUANTITY (in Theme 52,Anomaly)
[14.00,0.16]PROGRAM COSTS (in Theme 120,Emerging)
[14.00,0.37]PRODUCT_SUPPORT ANALYTICAL (in Theme 147,Anomaly)
[14.00,0.16]AIR SYSTEMS (in Theme 13,Anomaly)
[14.00,0.09]CONFIGURATION CONTROL (in Theme 154,Emerging)
[14.00,0.06]CONTRACTOR PERSONNEL (in Theme 106,Anomaly)
[14.00,0.33]RESOURCES REQUIRED (in Theme 155,Anomaly)
[14.00,0.08]DESIGN OBJECTIVES (in Theme 176,Popularity)
[14.00,0.09]MISSION CRITICAL (in Theme 120,Emerging)
[14.00,0.21]FIXED_PRICE CONTRACTS (in Theme 69,Anomaly)
[14.00,0.20]PERFORMANCE OUTCOMES (in Theme 149,Anomaly)
[14.00,0.41]CONTRACT AWARDS (in Theme 167,Popularity)
[14.00,0.05]SUPPLY MANAGEMENT (in Theme 168,Anomaly)
[14.00,0.28]CONTRACT PRICING (in Theme 149,Anomaly)
[14.00,0.14]MAINTENANCE DATA (in Theme 169,Emerging)
[13.00,0.04]RELIABILITY MANAGEMENT (in Theme 153,Anomaly)
[13.00,0.24]INDUSTRIAL FACILITIES (in Theme 169,Emerging)
[13.00,0.01]ENGINEERING MANAGEMENT (in Theme 108,Anomaly)
[13.00,0.03]DEFENSE CONTRACT (in Theme 124,Anomaly)
[13.00,0.04]SUPPORT PLANNING (in Theme 120,Emerging)
[13.00,0.50]SUPPORT SERVICES (in Theme 179,Anomaly)
[13.00,0.33]CONTRACT ACTION (in Theme 104,Emerging)
[13.00,0.13]GENERAL PURPOSE (in Theme 42,Anomaly)
[13.00,0.06]FEDERAL PROCUREMENT (in Theme 104,Emerging)
[13.00,0.05]SUPPORT COST (in Theme 169,Emerging)
[13.00,0.50]ACQUISITION STRATEGIES (in Theme 157,Popularity)
[13.00,0.05]TOTAL SYSTEM (in Theme 68,Anomaly)
[13.00,0.17]WORKING LEVEL (in Theme 154,Emerging)
[13.00,0.61]IA CONTROLS (in Theme 32,Anomaly)
[13.00,0.22]HIGHER LEVEL (in Theme 147,Anomaly)
[13.00,0.18]REPRESENTATIVE TEST (in Theme 38,Anomaly)
[13.00,0.12]SOFTWARE DOCUMENTATION (in Theme 179,Anomaly)
[13.00,0.12]SYSTEM FUNCTIONAL (in Theme 120,Emerging)
[13.00,0.03]PROGRAM LIFE_CYCLE (in Theme 108,Anomaly)
[13.00,0.03]DESIGN ENGINEERING (in Theme 99,Emerging)
[13.00,0.01]DATA REQUIREMENTS (in Theme 46,Emerging)
[12.00,0.07]SUPPLY SYSTEM (in Theme 168,Anomaly)

[12.00,0.03]SUPPORT CONTRACTS (in Theme 131,Anomaly)
[12.00,0.07]RESOURCES SUPPORT (in Theme 155,Anomaly)
[12.00,0.09]SYSTEMS APPROACH (in Theme 67,Anomaly)
[12.00,0.09]DATA REPORTING (in Theme 157,Popularity)
[12.00,0.07]COST ELEMENTS (in Theme 111,Emerging)
[12.00,0.40]PROGRAM GOALS (in Theme 176,Popularity)
[12.00,1.00]INDEPENDENT COST (in Theme 176,Popularity)
[12.00,0.10]EARLY OPERATIONAL (in Theme 149,Anomaly)
[12.00,0.01]MAINTENANCE MANAGEMENT (in Theme 169,Emerging)
[12.00,0.33]PROGRAM RISK (in Theme 176,Popularity)
[12.00,0.45]DEVELOPMENT TEST (in Theme 176,Popularity)
[12.00,0.12]EFFECTIVE SUPPORT (in Theme 99,Emerging)
[12.00,0.01]LOGISTICS INFORMATION (in Theme 169,Emerging)
[12.00,0.05]PHASE SUSTAINMENT (in Theme 145,Anomaly)
[12.00,0.17]CONTRACT TERMS (in Theme 21,Anomaly)
[12.00,0.07]SYSTEMS CENTER (in Theme 169,Emerging)
[12.00,0.38]TYPE CONTRACTS (in Theme 169,Emerging)
[12.00,0.38]MISSION FAILURES (in Theme 68,Anomaly)
[12.00,0.07]SOFTWARE DEVELOPMENT (in Theme 169,Emerging)
[12.00,0.15]DMSMS MANAGEMENT (in Theme 99,Emerging)
[12.00,0.02]TEST PROGRAM (in Theme 176,Popularity)
[11.00,0.01]LOGISTICS MANAGEMENT (in Theme 169,Emerging)
[11.00,0.02]MANAGEMENT PLANNING (in Theme 120,Emerging)
[11.00,1.00]ACQUISITION RESOURCES (in Theme 155,Anomaly)
[11.00,0.56]QUANTITY EOQ (in Theme 52,Anomaly)
[11.00,0.40]MANAGEMENT AGENCY (in Theme 154,Emerging)
[11.00,0.07]RELIABILITY ENGINEERING (in Theme 108,Anomaly)
[11.00,0.15]ANALYSIS IMPROVEMENT (in Theme 120,Emerging)
[11.00,0.05]RELATED DESIGN (in Theme 169,Emerging)
[11.00,0.13]TECHNICAL DOCUMENTATION (in Theme 179,Anomaly)
[11.00,1.00]TECHNICAL ARCHITECTURE (in Theme 46,Emerging)
[11.00,0.12]ORGANIC SUPPORT (in Theme 169,Emerging)
[11.00,0.20]ENVIRONMENTAL SAFETY (in Theme 66,Anomaly)
[11.00,0.46]FIXED_PRICE INCENTIVE (in Theme 169,Emerging)
[11.00,0.03]REQUIRED DATA (in Theme 67,Anomaly)
[11.00,0.13]FIXED_PRICE CONTRACT (in Theme 69,Anomaly)
[11.00,0.02]ANALYSIS PROCESS (in Theme 157,Popularity)
[11.00,0.01]LOGISTICS PROGRAM (in Theme 169,Emerging)
[11.00,0.11]PROGRAM PLANS (in Theme 172,Popularity)
[11.00,0.50]DETAILED TEST (in Theme 176,Popularity)
[11.00,0.13]FULL OPERATIONAL (in Theme 149,Anomaly)
[11.00,0.33]FACILITIES MAINTENANCE (in Theme 169,Emerging)
[11.00,0.02]SYSTEM TESTING (in Theme 179,Anomaly)
[11.00,0.17]DATA ANALYSIS (in Theme 15,Anomaly)
[11.00,0.07]MAJOR PROGRAM (in Theme 66,Anomaly)
[10.00,0.06]PROGRAM LEVEL (in Theme 106,Anomaly)
[10.00,0.11]FAILURE REPORTING (in Theme 157,Popularity)
[10.00,1.00]SERVICE ACQUISITION (in Theme 157,Popularity)
[10.00,0.02]SUSTAINMENT SYSTEMS (in Theme 157,Popularity)
[10.00,0.07]COST OBJECTIVES (in Theme 176,Popularity)
[10.00,0.17]BUSINESS STRATEGY (in Theme 124,Anomaly)
[10.00,0.11]DESIGN CONSIDERATIONS (in Theme 154,Emerging)
[10.00,0.10]TEST OBJECTIVES (in Theme 176,Popularity)
[10.00,0.03]REQUIRED PERFORMANCE (in Theme 67,Anomaly)
[10.00,0.30]SYSTEMS ENGINEER (in Theme 153,Anomaly)
[10.00,0.19]HUMAN PERFORMANCE (in Theme 108,Anomaly)
[10.00,0.04]SPECIFIC SYSTEM (in Theme 120,Emerging)
[10.00,0.27]DATA MANAGERS (in Theme 42,Anomaly)
[10.00,0.18]FUNCTIONAL REQUIREMENTS (in Theme 120,Emerging)
[10.00,0.08]LIFE_CYCLE ENGINEERING (in Theme 108,Anomaly)
[10.00,1.00]PERFORMANCE CHARACTERISTICS (in Theme 46,Emerging)
[10.00,0.30]PROGRAM FUNDING (in Theme 176,Popularity)
[10.00,1.00]COST CONTROL (in Theme 172,Popularity)
[10.00,0.19]FINAL COST (in Theme 15,Anomaly)
[10.00,0.06]SPECIAL EQUIPMENT (in Theme 169,Emerging)
[10.00,0.02]GOVERNMENT CONTRACTOR (in Theme 42,Anomaly)
[10.00,0.26]CONTINUOUS PROCESS (in Theme 141,Emerging)
[10.00,0.08]TEST SUPPORT (in Theme 169,Emerging)
[9.00,0.50]TRAINING MATERIALS (in Theme 179,Anomaly)
[9.00,0.15]PERFORMANCE MEASURES (in Theme 32,Anomaly)
[9.00,0.13]MATERIAL AVAILABILITY (in Theme 157,Popularity)
[9.00,0.05]PROVIDE ADDITIONAL (in Theme 176,Popularity)
[9.00,0.05]EQUIPMENT REPAIR (in Theme 141,Emerging)
[9.00,0.67]BUSINESS CONCERNS (in Theme 124,Anomaly)
[9.00,0.08]DATA ENVIRONMENT (in Theme 22,Anomaly)
[9.00,0.06]COST ANALYSIS (in Theme 176,Popularity)
[9.00,0.02]SERVICES REQUIRED (in Theme 179,Anomaly)
[9.00,0.07]FUNCTIONS REQUIRED (in Theme 111,Emerging)
[9.00,0.39]NAVAL AIR (in Theme 169,Emerging)
[9.00,0.07]CONSTRUCTION CONTRACTS (in Theme 111,Emerging)

[9.00,1.00]SUPPORT CENTER (in Theme 169,Emerging)
[9.00,0.17]II PROGRAMS (in Theme 145,Anomaly)
[9.00,0.10]MANAGEMENT STRUCTURE (in Theme 111,Emerging)
[9.00,0.03]MATERIAL EQUIPMENT (in Theme 99,Emerging)
[9.00,0.02]DATA STRATEGY (in Theme 166,Anomaly)
[9.00,0.12]ELECTRONIC TECHNICAL (in Theme 172,Popularity)
[9.00,0.05]INFORMATION OPERATIONS (in Theme 169,Emerging)
[9.00,0.04]MATERIAL SUPPORT (in Theme 99,Emerging)
[9.00,0.04]SUSTAINMENT PROGRAM (in Theme 157,Popularity)
[9.00,1.00]PERFORMANCE RELIABILITY (in Theme 153,Anomaly)
[9.00,0.06]INTERFACE REQUIREMENTS (in Theme 99,Emerging)
[9.00,0.07]TRAINING FACILITIES (in Theme 169,Emerging)
[9.00,1.00]EXCHANGE DATA (in Theme 46,Emerging)
[9.00,0.07]SUSTAINMENT STRATEGIES (in Theme 157,Popularity)
[9.00,0.23]DATA BASE (in Theme 46,Emerging)
[9.00,0.08]STANDARDS PERFORMANCE (in Theme 32,Anomaly)
[9.00,0.07]MANAGER LOGISTICS (in Theme 108,Anomaly)
[9.00,0.08]CURRENT ACQUISITION (in Theme 157,Popularity)
[9.00,0.06]SYSTEM SOFTWARE (in Theme 169,Emerging)
[9.00,0.25]DEVELOPMENT MODEL (in Theme 179,Anomaly)
[9.00,0.11]RESOURCE MANAGEMENT (in Theme 95,Anomaly)
[9.00,0.02]SYSTEM DATA (in Theme 46,Emerging)
[9.00,0.05]MISSION PERFORMANCE (in Theme 120,Emerging)
[9.00,0.03]LOGISTICS PRODUCT (in Theme 169,Emerging)
[9.00,0.17]DOD WIDE (in Theme 32,Anomaly)
[9.00,0.01]SUPPORT DATA (in Theme 46,Emerging)
[8.00,0.33]DEVELOPMENT EFFORTS (in Theme 154,Emerging)
[8.00,0.01]ACQUISITION CONTRACTS (in Theme 131,Anomaly)
[8.00,0.09]ACTION SYSTEM (in Theme 104,Emerging)
[8.00,0.05]REPORTING REQUIREMENTS (in Theme 157,Popularity)
[8.00,0.04]OPERATIONAL PERFORMANCE (in Theme 46,Emerging)
[8.00,0.28]TECHNICAL AUTHORITY (in Theme 46,Emerging)
[8.00,0.13]DOCUMENTATION SUPPORT (in Theme 179,Anomaly)
[8.00,0.14]CHANGE MANAGEMENT (in Theme 21,Anomaly)
[8.00,0.07]EXISTING PROGRAM (in Theme 21,Anomaly)
[8.00,0.01]DESIGN REQUIREMENTS (in Theme 99,Emerging)
[8.00,0.04]MANAGEMENT APPROACH (in Theme 67,Anomaly)
[8.00,1.00]INFORMATION EXCHANGE (in Theme 46,Emerging)
[8.00,0.17]CONTRACT DELIVERY (in Theme 155,Anomaly)
[8.00,0.01]SYSTEMS PROGRAM (in Theme 172,Popularity)
[8.00,1.00]DEVELOPMENT ACTIVITIES (in Theme 154,Emerging)
[8.00,0.05]PROVIDE EFFECTIVE (in Theme 99,Emerging)
[8.00,0.20]SUPPORT AGREEMENTS (in Theme 153,Anomaly)
[8.00,0.16]VERIFICATION TESTING (in Theme 70,Anomaly)
[8.00,0.04]LOGISTICS RELATED (in Theme 169,Emerging)
[8.00,0.04]PROGRAM CHANGE (in Theme 21,Anomaly)
[8.00,0.05]SUPPORTING DATA (in Theme 95,Anomaly)
[8.00,0.35]ENGINEERING SE (in Theme 166,Anomaly)
[8.00,0.33]SPECIFICATION REQUIREMENTS (in Theme 172,Popularity)
[8.00,0.11]SPECIAL CONTRACT (in Theme 169,Emerging)
[8.00,0.24]DEVELOPMENT EMD (in Theme 124,Anomaly)
[8.00,0.03]PROGRAM MILESTONE (in Theme 145,Anomaly)
[8.00,0.11]SYSTEM RELIABILITY (in Theme 153,Anomaly)
[8.00,0.06]EXISTING CONTRACTS (in Theme 21,Anomaly)
[8.00,0.02]MANAGEMENT CONTROL (in Theme 172,Popularity)
[8.00,0.07]MAINTENANCE PLANS (in Theme 172,Popularity)
[8.00,0.02]RELIABILITY PROGRAM (in Theme 153,Anomaly)
[8.00,0.01]PERSONNEL REQUIREMENTS (in Theme 106,Anomaly)
[8.00,0.01]SOFTWARE SYSTEMS (in Theme 169,Emerging)
[8.00,0.08]GOVERNMENT ORGANIZATION (in Theme 154,Emerging)
[8.00,0.33]SUPPORT CONCEPTS (in Theme 179,Anomaly)
[8.00,1.00]RELATED SUPPORT (in Theme 169,Emerging)
[8.00,0.02]ENGINEERING PROGRAM (in Theme 108,Anomaly)
[8.00,0.10]ACQUISITION COST (in Theme 157,Popularity)
[8.00,0.04]LOGISTICS PMS (in Theme 104,Emerging)
[8.00,0.09]SYSTEM HARDWARE (in Theme 67,Anomaly)
[8.00,0.14]RELATED ISSUES (in Theme 169,Emerging)
[8.00,1.00]COST CATEGORIES (in Theme 172,Popularity)
[7.00,0.04]EQUIPMENT REQUIRED (in Theme 67,Anomaly)
[7.00,0.02]MAINTENANCE PROGRAM (in Theme 169,Emerging)
[7.00,0.18]MANUFACTURING TECHNOLOGY (in Theme 157,Popularity)
[7.00,0.09]VERIFICATION REQUIREMENTS (in Theme 70,Anomaly)
[7.00,0.20]WARFIGHTER REQUIREMENTS (in Theme 149,Anomaly)
[7.00,0.05]CURRENT PROGRAM (in Theme 157,Popularity)
[7.00,0.04]PERFORMANCE DATA (in Theme 46,Emerging)
[7.00,0.10]APPROVED ACQUISITION (in Theme 75,Anomaly)
[7.00,0.04]PERSONNEL TRAINING (in Theme 106,Anomaly)
[7.00,0.22]CRITICAL SYSTEM (in Theme 68,Anomaly)
[7.00,0.02]ENGINEERING DESIGN (in Theme 108,Anomaly)
[7.00,0.03]MANAGEMENT STRATEGY (in Theme 115,Anomaly)

[7.00,0.03]BASED RELIABILITY (in Theme 157,Popularity)
[7.00,0.20]AIRCRAFT SYSTEMS (in Theme 172,Popularity)
[7.00,0.12]MATERIEL SYSTEM (in Theme 131,Anomaly)
[7.00,0.50]ACQUISITION APPROACH (in Theme 67,Anomaly)
[7.00,0.00]ACQUISITION CONTRACT (in Theme 167,Popularity)
[7.00,0.02]PLANNING PROGRAM (in Theme 120,Emerging)
[7.00,0.06]RELATED DATA (in Theme 169,Emerging)
[7.00,0.29]DEVELOPMENT MODELS (in Theme 153,Anomaly)
[7.00,1.00]MISSION ACCOMPLISHMENT (in Theme 120,Emerging)
[7.00,0.03]MAINTENANCE PROCESSES (in Theme 99,Emerging)
[7.00,0.04]SUPPORTABILITY REQUIREMENTS (in Theme 108,Anomaly)
[7.00,0.02]SUPPORT COST (in Theme 176,Popularity)
[7.00,0.08]DMSMS PROGRAM (in Theme 99,Emerging)
[7.00,1.00]MANUFACTURING SOURCES (in Theme 157,Popularity)
[7.00,0.07]MILITARY STANDARD (in Theme 167,Popularity)
[7.00,1.00]PROVIDE DETAILED (in Theme 176,Popularity)
[7.00,0.33]REPAIR WORKLOADS (in Theme 141,Emerging)
[7.00,0.01]PERSONNEL EQUIPMENT (in Theme 106,Anomaly)
[7.00,0.03]CONTROL SYSTEMS (in Theme 172,Popularity)
[7.00,0.20]DOD POLICIES (in Theme 176,Popularity)
[7.00,0.33]ENGINEERING LOGISTICS (in Theme 169,Emerging)
[7.00,0.12]ELECTRONIC SYSTEMS (in Theme 172,Popularity)
[7.00,0.05]FEE CONTRACT (in Theme 46,Emerging)
[7.00,0.01]SOFTWARE MANAGEMENT (in Theme 169,Emerging)
[7.00,0.04]MISSION REQUIREMENTS (in Theme 120,Emerging)
[6.00,0.05]MAINTENANCE COSTS (in Theme 120,Emerging)
[6.00,0.01]GOVERNMENT PROGRAM (in Theme 75,Anomaly)
[6.00,0.33]FMECA FAILURE (in Theme 68,Anomaly)
[6.00,0.29]REQUIREMENTS DETERMINATION (in Theme 155,Anomaly)
[6.00,0.08]FUTURE CONTRACTS (in Theme 176,Popularity)
[6.00,1.00]CHAIRMAN JOINT (in Theme 95,Anomaly)
[6.00,0.02]PBL SUPPORT (in Theme 149,Anomaly)
[6.00,0.01]RELIABILITY ANALYSIS (in Theme 153,Anomaly)
[6.00,0.03]TECHNICAL RISK (in Theme 176,Popularity)
[6.00,0.07]SOFTWARE RELATED (in Theme 169,Emerging)
[6.00,0.12]INTEROPERABILITY TESTING (in Theme 70,Anomaly)
[6.00,0.10]PERFORMANCE SPECIFICATIONS (in Theme 108,Anomaly)
[6.00,0.06]DOCUMENTATION REQUIRED (in Theme 179,Anomaly)
[6.00,0.06]REQUIREMENTS DEFINITION (in Theme 167,Popularity)
[6.00,0.01]LOGISTICS PLANNING (in Theme 120,Emerging)
[6.00,1.00]MISSION ESSENTIAL (in Theme 120,Emerging)
[6.00,0.10]GOVERNMENT PURPOSE (in Theme 42,Anomaly)
[6.00,0.02]SERVICES CONTRACT (in Theme 179,Anomaly)
[6.00,1.00]INCENTIVE TYPE (in Theme 169,Emerging)
[6.00,0.03]REQUIREMENTS DOCUMENTS (in Theme 56,Anomaly)
[6.00,0.03]FACILITIES ENGINEERING (in Theme 169,Emerging)
[6.00,0.01]SUPPORT PERFORMANCE (in Theme 169,Emerging)
[6.00,0.09]TERM TECHNICAL (in Theme 108,Anomaly)
[6.00,0.08]VEHICLE SYSTEMS (in Theme 172,Popularity)
[6.00,0.45]TEST PROCEDURE (in Theme 75,Anomaly)
[6.00,0.25]PROGRAM APPROVED (in Theme 75,Anomaly)
[6.00,0.33]ACQUISITION RELATED (in Theme 169,Emerging)
[6.00,0.60]EMD PHASE (in Theme 124,Anomaly)
[6.00,0.06]SYSTEM STRUCTURE (in Theme 111,Emerging)
[6.00,0.05]MANAGEMENT PLANS (in Theme 172,Popularity)
[6.00,0.07]REQUIRES PROGRAM (in Theme 167,Popularity)
[6.00,0.04]RELATED ACTIVITIES (in Theme 169,Emerging)
[6.00,0.14]OVERSIGHT PROGRAM (in Theme 95,Anomaly)
[6.00,0.07]SUPPORT CONTRACTORS (in Theme 108,Anomaly)
[6.00,0.06]INDIVIDUAL TRAINING (in Theme 106,Anomaly)
[6.00,0.20]DEVELOPMENT APPROACH (in Theme 67,Anomaly)
[6.00,0.01]PROGRAM PERFORMANCE (in Theme 46,Emerging)
[6.00,0.14]FAILURE CRITERIA (in Theme 68,Anomaly)
[6.00,0.02]PROGRAM DESIGN (in Theme 99,Emerging)
[6.00,0.08]MANAGEMENT WORKING (in Theme 154,Emerging)
[6.00,0.02]EQUIPMENT RELIABILITY (in Theme 153,Anomaly)
[6.00,0.03]SOFTWARE DATA (in Theme 169,Emerging)
[6.00,0.50]PROPRIETARY INFORMATION (in Theme 46,Emerging)
[6.00,0.10]DESIGN EFFORTS (in Theme 154,Emerging)
[6.00,0.50]WAIVER REQUEST (in Theme 148,Anomaly)
[6.00,0.08]EFFECTIVE MAINTENANCE (in Theme 99,Emerging)
[6.00,0.06]COMPONENT TESTING (in Theme 157,Popularity)
[6.00,0.02]RELATED INFORMATION (in Theme 169,Emerging)
[5.00,0.11]CRITICAL FAILURES (in Theme 68,Anomaly)
[5.00,0.40]PEO PROGRAM (in Theme 104,Emerging)
[5.00,0.03]BASED APPROACH (in Theme 67,Anomaly)
[5.00,0.06]EQUIPMENT RELATED (in Theme 169,Emerging)
[5.00,0.07]BASELINE DESIGN (in Theme 176,Popularity)
[5.00,1.00]CONSTRUCTION CONTRACT (in Theme 167,Popularity)
[5.00,0.03]USC SECTION (in Theme 167,Popularity)

[5.00,0.07]SUPPORT FACILITIES (in Theme 169,Emerging)
[5.00,0.03]SPECIFIC ELEMENTS (in Theme 111,Emerging)
[5.00,0.01]TIME BASED (in Theme 141,Emerging)
[5.00,0.06]NAVY TEST (in Theme 124,Anomaly)
[5.00,0.08]MAINTAINABILITY PROGRAM (in Theme 153,Anomaly)
[5.00,0.04]VEHICLE CONTROL (in Theme 172,Popularity)
[5.00,0.06]SUPPORT ARCHITECTURE (in Theme 46,Emerging)
[5.00,1.00]ANALYSIS TOOL (in Theme 15,Anomaly)
[5.00,0.11]DATA MODEL (in Theme 179,Anomaly)
[5.00,0.07]DEFENSE RESEARCH (in Theme 124,Anomaly)
[5.00,0.01]SYSTEM EVALUATION (in Theme 104,Emerging)
[5.00,0.05]STRATEGY MAINTENANCE (in Theme 166,Anomaly)
[5.00,0.05]HUMAN ENGINEERING (in Theme 108,Anomaly)
[5.00,0.07]MANAGEMENT ORGANIZATION (in Theme 154,Emerging)
[5.00,0.31]FUNCTIONAL PERFORMANCE (in Theme 120,Emerging)
[5.00,0.17]DOD JOINT (in Theme 95,Anomaly)
[5.00,0.02]COSTS PERFORMANCE (in Theme 120,Emerging)
[5.00,0.03]GOVERNMENT ACTIVITIES (in Theme 154,Emerging)
[5.00,0.05]SUSTAINMENT APPROACH (in Theme 67,Anomaly)
[5.00,0.13]REDUCE PROGRAM (in Theme 176,Popularity)
[5.00,0.17]INITIAL CONTRACT (in Theme 106,Anomaly)
[5.00,0.07]MANAGEMENT TOOLS (in Theme 147,Anomaly)
[5.00,0.03]TECHNICAL APPROACH (in Theme 67,Anomaly)
[5.00,0.06]PROPOSED ACQUISITION (in Theme 176,Popularity)
[5.00,0.50]GATHERING DATA (in Theme 46,Emerging)
[5.00,1.00]TEST PROCEDURES (in Theme 147,Anomaly)
[5.00,0.33]TECHNICAL PARAMETER (in Theme 46,Emerging)
[5.00,0.02]MAINTENANCE CAPABILITY (in Theme 32,Anomaly)
[5.00,0.09]ACTION ITEMS (in Theme 104,Emerging)
[5.00,0.04]SUSTAINMENT EFFORTS (in Theme 154,Emerging)
[5.00,0.08]SYSTEM SPECIFICATION (in Theme 172,Popularity)
[5.00,0.33]SYSTEM CHARACTERISTICS (in Theme 46,Emerging)
[5.00,0.09]AWARD CONTRACTS (in Theme 167,Popularity)
[5.00,0.01]PROGRAM STRATEGY (in Theme 166,Anomaly)
[5.00,0.03]MAINTAINABILITY DESIGN (in Theme 153,Anomaly)
[5.00,0.25]ENGINEERING DEVELOPMENT (in Theme 108,Anomaly)
[5.00,0.01]PERFORMANCE MANAGEMENT (in Theme 46,Emerging)
[5.00,0.13]PERSONNEL NEEDED (in Theme 141,Emerging)
[5.00,0.06]SYSTEMS PROVIDING (in Theme 99,Emerging)
[5.00,0.06]DESIGN REVIEWS (in Theme 157,Popularity)
[5.00,1.00]TECHNOLOGY STANDARDS (in Theme 32,Anomaly)
[5.00,1.00]PRODUCTION FACILITIES (in Theme 169,Emerging)
[5.00,0.06]PRIMARY SUPPORT (in Theme 157,Popularity)
[5.00,0.05]DEVELOPMENT EFFORT (in Theme 141,Emerging)
[5.00,0.04]INCENTIVE CONTRACT (in Theme 169,Emerging)
[5.00,0.07]SYSTEM ELEMENTS (in Theme 111,Emerging)
[5.00,0.02]ANALYSIS REQUIRED (in Theme 67,Anomaly)
[5.00,0.67]INITIAL OPERATIONAL (in Theme 46,Emerging)
[5.00,0.31]REPAIRABLE ITEMS (in Theme 91,Anomaly)
[5.00,0.04]PACKAGE PROCUREMENT (in Theme 104,Emerging)
[5.00,0.05]ALTERNATIVE DESIGN (in Theme 157,Popularity)
[5.00,0.17]PERSONNEL SURVIVABILITY (in Theme 106,Anomaly)
[5.00,0.50]REPAIRABLE ITEM (in Theme 91,Anomaly)
[5.00,0.12]SUCCESSFUL MISSION (in Theme 120,Emerging)
[5.00,0.04]SOFTWARE CONFIGURATION (in Theme 169,Emerging)
[5.00,0.07]ADMINISTRATIVE CONTROL (in Theme 66,Anomaly)
[5.00,0.07]PLANNING DOCUMENTS (in Theme 56,Anomaly)
[5.00,0.14]SKILLS REQUIRED (in Theme 67,Anomaly)
[5.00,0.07]SPECIFICATIONS ENGINEERING (in Theme 108,Anomaly)
[5.00,0.13]SOFTWARE RESOURCES (in Theme 155,Anomaly)
[5.00,0.01]ENGINEERING TECHNICAL (in Theme 46,Emerging)
[5.00,0.08]IA PROGRAM (in Theme 108,Anomaly)
[5.00,0.06]COSTS RELATED (in Theme 169,Emerging)
[5.00,0.02]CRITICAL MAINTENANCE (in Theme 68,Anomaly)
[5.00,0.01]PERSONNEL MANAGEMENT (in Theme 106,Anomaly)
[5.00,0.01]SUSTAINMENT LOGISTICS (in Theme 157,Popularity)
[5.00,0.05]REPORTING PROCESS (in Theme 157,Popularity)
[5.00,0.03]OPERATIONS CENTER (in Theme 169,Emerging)
[5.00,0.02]EVALUATION STRATEGY (in Theme 104,Emerging)
[5.00,0.00]SUPPORT MANAGEMENT (in Theme 169,Emerging)
[5.00,0.04]OPERATING SUPPORT (in Theme 176,Popularity)
[4.00,0.02]SYSTEM CAPABILITIES (in Theme 67,Anomaly)
[4.00,0.02]LEVEL REQUIREMENTS (in Theme 106,Anomaly)
[4.00,0.13]SUPPORT SOLUTION (in Theme 149,Anomaly)
[4.00,0.03]CONTRACT DATA (in Theme 167,Popularity)
[4.00,0.01]LOGISTICS STRATEGY (in Theme 166,Anomaly)
[4.00,0.01]TEST SYSTEM (in Theme 176,Popularity)
[4.00,0.03]MISSION CAPABILITY (in Theme 120,Emerging)
[4.00,0.20]DESIGN CONCEPTS (in Theme 179,Anomaly)
[4.00,0.14]ITEMS REQUIRING (in Theme 106,Anomaly)

[4.00,0.11]MAINTENANCE STRATEGIES (in Theme 157,Popularity)
[4.00,0.01]SYSTEM MAINTENANCE (in Theme 169,Emerging)
[4.00,0.07]KEY SUSTAINMENT (in Theme 99,Emerging)
[4.00,0.09]PBL APPROACH (in Theme 149,Anomaly)
[4.00,0.05]FUNCTIONAL RESPONSIBILITIES (in Theme 66,Anomaly)
[4.00,0.01]CONTRACT DEVELOPMENT (in Theme 167,Popularity)
[4.00,1.00]DISCREPANCY REPORTS (in Theme 168,Anomaly)
[4.00,0.04]LIMITED BASED (in Theme 32,Anomaly)
[4.00,0.00]LOGISTICS SYSTEM (in Theme 169,Emerging)
[4.00,0.09]DATA NEEDED (in Theme 141,Emerging)
[4.00,0.02]SUPPORT ITEMS (in Theme 91,Anomaly)
[4.00,0.04]SPECIFIC MAINTENANCE (in Theme 120,Emerging)
[4.00,0.02]DEVELOPMENT TESTING (in Theme 179,Anomaly)
[4.00,0.02]LEVEL RISK (in Theme 176,Popularity)
[4.00,0.20]MEASUREMENT SYSTEM (in Theme 172,Popularity)
[4.00,0.03]PROGRAM STRUCTURE (in Theme 111,Emerging)
[4.00,0.20]SYSTEM APPROACH (in Theme 67,Anomaly)
[4.00,0.02]SUPPORT CONFIGURATION (in Theme 154,Emerging)
[4.00,0.03]DEPLOYMENT SUPPORT (in Theme 154,Emerging)
[4.00,0.01]EVALUATION MANAGEMENT (in Theme 104,Emerging)
[4.00,0.33]AFFORDABLE COST (in Theme 115,Anomaly)
[4.00,0.25]SYSTEM FUNCTIONALITY (in Theme 172,Popularity)
[4.00,0.08]PROGRAM DECISIONS (in Theme 149,Anomaly)
[4.00,0.05]NAVY MODELING (in Theme 124,Anomaly)
[4.00,0.22]MAINTENANCE POLICIES (in Theme 176,Popularity)
[4.00,0.04]FORMAL REVIEW (in Theme 70,Anomaly)
[4.00,0.06]MANAGEMENT REVIEWS (in Theme 157,Popularity)
[4.00,0.03]CRITICAL AREAS (in Theme 104,Emerging)
[4.00,0.13]SUSTAINMENT PLANNING (in Theme 157,Popularity)
[4.00,0.03]FUTURE SYSTEMS (in Theme 176,Popularity)
[4.00,0.02]PERFORMANCE ISSUES (in Theme 46,Emerging)
[4.00,0.21]UNFAVORABLE COST (in Theme 176,Popularity)
[4.00,0.17]SUPPORT EFFORTS (in Theme 154,Emerging)
[4.00,0.04]SPECIFIC TEST (in Theme 120,Emerging)
[4.00,0.01]SYSTEM ANALYSIS (in Theme 15,Anomaly)
[4.00,0.04]EFFECTIVE SYSTEMS (in Theme 99,Emerging)
[4.00,0.75]PROPOSED TEST (in Theme 176,Popularity)
[4.00,0.50]QUALITY PERFORMANCE (in Theme 46,Emerging)
[4.00,0.04]MANAGEMENT CENTER (in Theme 169,Emerging)
[4.00,0.02]RELIABILITY REQUIREMENTS (in Theme 153,Anomaly)
[4.00,0.06]MANAGEMENT CRITERIA (in Theme 68,Anomaly)
[4.00,0.50]PROCESS BEGINS (in Theme 166,Anomaly)
[4.00,0.04]EFFECTIVE TRAINING (in Theme 99,Emerging)
[4.00,0.10]INFORMATION CPI (in Theme 141,Emerging)
[4.00,0.01]SYSTEMS DATA (in Theme 46,Emerging)
[4.00,0.13]SUPPORT CAPABILITIES (in Theme 67,Anomaly)
[4.00,0.11]ASSESS INFORMATION (in Theme 22,Anomaly)
[4.00,0.01]SUSTAINMENT PERFORMANCE (in Theme 157,Popularity)
[4.00,0.67]PRICE INCENTIVE (in Theme 169,Emerging)
[4.00,0.01]CRITICAL PERFORMANCE (in Theme 68,Anomaly)
[4.00,0.10]USER CAPABILITIES (in Theme 68,Anomaly)
[4.00,0.06]OPERATIONAL ASSESSMENTS (in Theme 172,Popularity)
[4.00,0.11]AFFORDABILITY COST (in Theme 154,Emerging)
[4.00,0.11]ACTUAL OPERATIONAL (in Theme 99,Emerging)
[4.00,0.04]DEVELOPMENT PROGRAMS (in Theme 120,Emerging)
[4.00,0.04]FUNCTIONAL CAPABILITY (in Theme 120,Emerging)
[4.00,0.05]INDEPENDENT ASSESSMENT (in Theme 176,Popularity)
[4.00,0.50]CHANGE ORDERS (in Theme 21,Anomaly)
[4.00,0.17]COST INFORMATION (in Theme 46,Emerging)
[4.00,0.06]INDIVIDUAL EQUIPMENT (in Theme 106,Anomaly)
[4.00,0.05]LOGISTICS COMPONENT (in Theme 157,Popularity)
[4.00,0.10]DOD INFORMATION (in Theme 167,Popularity)
[4.00,0.04]LOGISTICS SUPPORTABILITY (in Theme 108,Anomaly)
[4.00,0.02]OPERATIONS FACILITIES (in Theme 169,Emerging)
[4.00,0.04]SERVICE MANAGEMENT (in Theme 157,Popularity)
[4.00,0.07]MISSION SYSTEM (in Theme 172,Popularity)
[4.00,0.04]PRODUCT TECHNICAL (in Theme 169,Emerging)
[4.00,0.03]PRODUCT_SUPPORT PERFORMANCE (in Theme 149,Anomaly)
[4.00,0.50]RELATED PROGRAM (in Theme 169,Emerging)
[4.00,0.02]MANAGEMENT SERVICES (in Theme 179,Anomaly)
[4.00,0.06]DESIGN DOCUMENTATION (in Theme 179,Anomaly)
[4.00,1.00]MAIS ACQUISITION (in Theme 157,Popularity)
[3.00,1.00]DISTRIBUTION SYSTEM (in Theme 172,Popularity)
[3.00,0.03]BUSINESS MANAGEMENT (in Theme 124,Anomaly)
[3.00,0.06]SPECIAL SUPPORT (in Theme 169,Emerging)
[3.00,0.14]GOVERNMENT SITE (in Theme 120,Emerging)
[3.00,1.00]PROVIDE ADEQUATE (in Theme 176,Popularity)
[3.00,0.03]DOD OVERSIGHT (in Theme 95,Anomaly)
[3.00,0.02]RELATED MAINTENANCE (in Theme 169,Emerging)
[3.00,0.02]SUPPLY SYSTEMS (in Theme 168,Anomaly)

[3.00,0.01]TRAINING JOINT (in Theme 179,Anomaly)
[3.00,0.02]COSTS DESIGN (in Theme 120,Emerging)
[3.00,0.13]PROGRAM SCHEDULES (in Theme 176,Popularity)
[3.00,0.03]PROGRAM ELEMENTS (in Theme 111,Emerging)
[3.00,0.06]DEVELOPMENTAL TESTS (in Theme 179,Anomaly)
[3.00,0.14]PBL ARRANGEMENTS (in Theme 149,Anomaly)
[3.00,0.40]INFORMATION SHARING (in Theme 46,Emerging)
[3.00,0.02]SYSTEMS FACILITIES (in Theme 169,Emerging)
[3.00,0.05]COMPUTER PROGRAM (in Theme 99,Emerging)
[3.00,0.02]OSD COST (in Theme 166,Anomaly)
[3.00,0.09]PROVIDE TIMELY (in Theme 155,Anomaly)
[3.00,0.04]DEVELOPMENT CENTER (in Theme 169,Emerging)
[3.00,0.07]SUPPORT MODULE (in Theme 120,Emerging)
[3.00,0.06]DEFENSE ADVANCED (in Theme 179,Anomaly)
[3.00,0.06]PROPOSED PROGRAMS (in Theme 176,Popularity)
[3.00,0.04]INFRASTRUCTURE REQUIREMENTS (in Theme 99,Emerging)
[3.00,0.04]AIR SYSTEM (in Theme 13,Anomaly)
[3.00,0.00]PROGRAM SUPPORT (in Theme 176,Popularity)
[3.00,0.03]CONTRACT COST (in Theme 167,Popularity)
[3.00,1.00]PROTOTYPE DEVELOPMENT (in Theme 124,Anomaly)
[3.00,0.01]PERSONNEL AVAILABILITY (in Theme 106,Anomaly)
[3.00,0.04]CONTRACT REQUIREMENTS (in Theme 167,Popularity)
[3.00,0.11]COST ANALYSES (in Theme 166,Anomaly)
[3.00,0.08]INCENTIVE AWARD (in Theme 169,Emerging)
[3.00,0.04]CONTRACT REQUIRES (in Theme 167,Popularity)
[3.00,0.02]DEFENSE CONTRACTORS (in Theme 108,Anomaly)
[3.00,0.10]IMPROVED MAINTENANCE (in Theme 46,Emerging)
[3.00,0.01]DESIGN TECHNICAL (in Theme 99,Emerging)
[3.00,0.33]TRAINING PRODUCTS (in Theme 66,Anomaly)
[3.00,0.08]SUPPORT ASSETS (in Theme 91,Anomaly)
[3.00,0.01]PRODUCT SUPPORT ACTIVITIES (in Theme 154,Emerging)
[3.00,0.03]REQUIREMENTS DOCUMENTATION (in Theme 179,Anomaly)
[3.00,0.11]PLANNING ANALYSES (in Theme 166,Anomaly)
[3.00,0.06]PROPOSED SUPPORT (in Theme 176,Popularity)
[3.00,0.05]PHASE SYSTEM (in Theme 145,Anomaly)
[3.00,0.07]PROGRAM RISKS (in Theme 108,Anomaly)
[3.00,0.02]PERFORMANCE REPORTS (in Theme 168,Anomaly)
[3.00,0.03]REPORTING ANALYSIS (in Theme 157,Popularity)
[3.00,0.02]PERFORMANCE REPORTING (in Theme 157,Popularity)
[3.00,0.03]SUPPORT PROCUREMENT (in Theme 104,Emerging)
[3.00,0.03]PROCESS METRICS (in Theme 157,Popularity)
[3.00,0.03]INFORMATION CAPABILITIES (in Theme 67,Anomaly)
[3.00,0.02]ACQUISITION PRODUCTION (in Theme 157,Popularity)
[3.00,0.03]SUSTAINMENT PROCESSES (in Theme 99,Emerging)
[3.00,0.01]MANAGEMENT DESIGN (in Theme 99,Emerging)
[3.00,0.08]MEMORANDUM DATED (in Theme 145,Anomaly)
[3.00,0.14]SYSTEM BASELINE (in Theme 176,Popularity)
[3.00,0.06]MEASURES IDENTIFIED (in Theme 32,Anomaly)
[3.00,0.01]LEVEL PERFORMANCE (in Theme 106,Anomaly)
[3.00,0.02]ASSESSMENT PROCESS (in Theme 157,Popularity)
[3.00,0.07]PROCESS DOCUMENTS (in Theme 56,Anomaly)
[3.00,0.01]REQUIRED SYSTEM (in Theme 67,Anomaly)
[3.00,0.02]CRITICAL ITEMS (in Theme 68,Anomaly)
[3.00,0.17]DEFENSE DOD (in Theme 167,Popularity)
[3.00,0.11]ACTUAL SYSTEM (in Theme 99,Emerging)
[3.00,0.03]TEST REPORTING (in Theme 157,Popularity)
[3.00,0.13]RESOLVE PROGRAM (in Theme 66,Anomaly)
[3.00,0.06]VULNERABILITY PROGRAM (in Theme 70,Anomaly)
[3.00,0.17]DOD FEDERAL (in Theme 154,Emerging)
[3.00,0.02]IDENTIFIED TECHNICAL (in Theme 32,Anomaly)
[3.00,0.04]MANAGEMENT OBJECTIVES (in Theme 176,Popularity)
[3.00,0.13]EQUIPMENT SPARES (in Theme 106,Anomaly)
[3.00,0.01]BUSINESS OPERATIONS (in Theme 169,Emerging)
[3.00,0.17]REPRESENTS PROGRAM (in Theme 149,Anomaly)
[3.00,0.50]AVIATION MAINTENANCE (in Theme 169,Emerging)
[3.00,0.02]COST ENGINEERING (in Theme 176,Popularity)
[3.00,0.02]MANPOWER COST (in Theme 106,Anomaly)
[3.00,0.01]TECHNICAL INFORMATION (in Theme 46,Emerging)
[3.00,0.01]RELIABILITY SYSTEMS (in Theme 153,Anomaly)
[3.00,0.03]DEVELOPMENT PROCUREMENT (in Theme 104,Emerging)
[3.00,0.02]RELATED PERFORMANCE (in Theme 169,Emerging)
[3.00,0.18]SITE LOGISTICS (in Theme 120,Emerging)
[3.00,0.05]PROGRAM RESPONSIBILITIES (in Theme 66,Anomaly)
[3.00,0.11]ASSESS PERFORMANCE (in Theme 22,Anomaly)
[3.00,0.06]SYSTEM TECHNICAL (in Theme 46,Emerging)
[3.00,0.02]EVALUATION PERSONNEL (in Theme 106,Anomaly)
[3.00,1.00]FORCE APPLICATION (in Theme 104,Emerging)
[3.00,0.50]FINAL DESIGN (in Theme 99,Emerging)
[3.00,0.03]KEY ACTIVITIES (in Theme 99,Emerging)
[3.00,0.02]SIGNIFICANT COST (in Theme 149,Anomaly)

[3.00,0.04]PRODUCTION SUSTAINMENT (in Theme 157,Popularity)
[3.00,0.11]APPLICATION SYSTEM (in Theme 104,Emerging)
[3.00,0.20]DATA SHARING (in Theme 46,Emerging)
[3.00,0.01]OPERATIONS PROGRAM (in Theme 169,Emerging)
[3.00,0.05]STANDARD COMMERCIAL (in Theme 167,Popularity)
[3.00,0.25]SERVICE COST (in Theme 157,Popularity)
[3.00,0.04]INTEGRATED ELECTRONIC (in Theme 172,Popularity)
[3.00,0.09]EXECUTIVE ORDER (in Theme 176,Popularity)
[3.00,0.01]TEST SUPPORT (in Theme 176,Popularity)
[3.00,0.07]PROCEDURES BASED (in Theme 147,Anomaly)
[3.00,0.02]EFFECTIVE LIFE_CYCLE (in Theme 99,Emerging)
[3.00,0.02]REPORTING SYSTEMS (in Theme 157,Popularity)
[3.00,1.00]ADEQUATE FUNDING (in Theme 176,Popularity)
[3.00,0.06]INTEROPERABILITY REQUIREMENTS (in Theme 70,Anomaly)
[3.00,0.13]TECHNICAL ISSUES (in Theme 46,Emerging)
[3.00,0.04]INDIVIDUAL SYSTEM (in Theme 106,Anomaly)
[3.00,0.02]RELATED COST (in Theme 169,Emerging)
[3.00,0.02]MAINTENANCE EQUIPMENT (in Theme 169,Emerging)
[3.00,0.01]MAINTENANCE PROCESS (in Theme 157,Popularity)
[3.00,0.02]SPECIFIC REQUIREMENTS (in Theme 120,Emerging)
[3.00,0.15]PROCUREMENT PROGRAM (in Theme 104,Emerging)
[2.00,0.14]OPERATIONAL CONTROLS (in Theme 32,Anomaly)
[2.00,0.03]DOD REQUIREMENTS (in Theme 167,Popularity)
[2.00,0.01]METRICS TIME (in Theme 157,Popularity)
[2.00,0.03]SYSTEM PROVIDING (in Theme 99,Emerging)
[2.00,0.03]PM MANAGEMENT (in Theme 147,Anomaly)
[2.00,0.06]FAILURES TOTAL (in Theme 68,Anomaly)
[2.00,0.01]EQUIPMENT SOFTWARE (in Theme 169,Emerging)
[2.00,0.02]RELATED TECHNICAL (in Theme 169,Emerging)
[2.00,1.00]CONTRACTOR SELECTION (in Theme 42,Anomaly)
[2.00,1.00]PERIOD COVERED (in Theme 144,Anomaly)
[2.00,0.04]PRODUCTION EFFORTS (in Theme 154,Emerging)
[2.00,0.50]DEMONSTRATED RESULTS (in Theme 52,Anomaly)
[2.00,0.07]DIACAP DOD (in Theme 15,Anomaly)
[2.00,0.02]SEE JOINT (in Theme 22,Anomaly)
[2.00,0.03]PROGRAM POLICY (in Theme 146,Anomaly)
[2.00,0.04]PERFORM DATA (in Theme 141,Emerging)
[2.00,0.08]QUANTITY INITIAL (in Theme 52,Anomaly)
[2.00,0.33]PROVIDE DETAILS (in Theme 155,Anomaly)
[2.00,0.14]RCM RELIABILITY (in Theme 153,Anomaly)
[2.00,0.01]PROCESS DOCUMENT (in Theme 145,Anomaly)
[2.00,0.02]DATA ACQUISITION (in Theme 157,Popularity)
[2.00,0.01]MISSION PERFORMANCE (in Theme 46,Emerging)
[2.00,0.33]SUSTAINMENT STRATEGY (in Theme 157,Popularity)
[2.00,0.01]NAVY DATA (in Theme 124,Anomaly)
[2.00,0.01]RISK SYSTEM (in Theme 176,Popularity)
[2.00,0.03]TOOLS SUPPORT (in Theme 147,Anomaly)
[2.00,0.02]COSTS LOGISTICS (in Theme 120,Emerging)
[2.00,0.01]REQUIRED CAPABILITY (in Theme 67,Anomaly)
[2.00,0.04]COMPREHENSIVE MAINTENANCE (in Theme 111,Emerging)
[2.00,0.01]SOFTWARE SUPPORTABILITY (in Theme 169,Emerging)
[2.00,0.01]GOVERNMENT FUNDING (in Theme 176,Popularity)
[2.00,0.03]PROVIDE SUPPORTING (in Theme 95,Anomaly)
[2.00,0.01]DESIGN PROCESS (in Theme 157,Popularity)
[2.00,0.02]AREAS MANAGEMENT (in Theme 104,Emerging)
[2.00,0.03]MULTIPLE REQUIREMENTS (in Theme 167,Popularity)
[2.00,0.06]SOLUTIONS SUPPORT (in Theme 131,Anomaly)
[2.00,0.03]SUPPORT MULTIPLE (in Theme 167,Popularity)
[2.00,0.01]FUTURE BUDGET (in Theme 176,Popularity)
[2.00,0.03]SYSTEM FAILURES (in Theme 68,Anomaly)
[2.00,0.03]PARTS BASED (in Theme 141,Emerging)
[2.00,0.04]DESIGN SPECIFICATIONS (in Theme 108,Anomaly)
[2.00,0.04]MAINTENANCE FUNCTIONS (in Theme 111,Emerging)
[2.00,1.00]INTER RELATED (in Theme 169,Emerging)
[2.00,0.03]PROGRAM ACTIONS (in Theme 104,Emerging)
[2.00,0.02]ACQUISITION LOGISTICS (in Theme 157,Popularity)
[2.00,0.20]PROGRAM PROJECT (in Theme 42,Anomaly)
[2.00,0.01]DESIGN INFORMATION (in Theme 46,Emerging)
[2.00,0.07]DETAILED GUIDANCE (in Theme 176,Popularity)
[2.00,0.02]RELIABILITY INFORMATION (in Theme 46,Emerging)
[2.00,1.00]STRATEGY BEGINS (in Theme 166,Anomaly)
[2.00,0.10]RATES PRODUCTION (in Theme 145,Anomaly)
[2.00,0.03]FACILITIES DESIGN (in Theme 169,Emerging)
[2.00,0.02]MANAGEMENT PROGRAMS (in Theme 120,Emerging)
[2.00,0.03]APPROVED PRIOR (in Theme 157,Popularity)
[2.00,0.02]SYSTEM RELATED (in Theme 169,Emerging)
[2.00,0.10]PBL AGREEMENTS (in Theme 153,Anomaly)
[2.00,0.50]PLANNING EFFORTS (in Theme 120,Emerging)
[2.00,0.01]TECHNICAL PROGRAM (in Theme 46,Emerging)
[2.00,0.50]REQUIREMENTS SOURCE (in Theme 155,Anomaly)

[2.00,0.17]SERVICE REQUIREMENTS (in Theme 157,Popularity)
[2.00,0.09]TIMELY INFORMATION (in Theme 155,Anomaly)
[2.00,0.05]STANDARD EVALUATION (in Theme 167,Popularity)
[2.00,0.01]PROGRAM METRICS (in Theme 157,Popularity)
[2.00,0.04]FUNCTION MISSION (in Theme 68,Anomaly)
[2.00,0.10]ANALYSIS ACTIVITY (in Theme 154,Emerging)
[2.00,0.07]COMPONENTS REQUIRING (in Theme 106,Anomaly)
[2.00,0.11]REPAIRABLE ASSETS (in Theme 91,Anomaly)
[2.00,0.01]DEVELOPMENT STRATEGY (in Theme 124,Anomaly)
[2.00,0.50]SUPPORT BEGINS (in Theme 166,Anomaly)
[2.00,0.03]ELEMENTS MAINTENANCE (in Theme 111,Emerging)
[2.00,0.13]FORMAL RELIABILITY (in Theme 70,Anomaly)
[2.00,1.00]ADVANCED DEVELOPMENT (in Theme 179,Anomaly)
[2.00,0.00]DESIGN SERVICES (in Theme 99,Emerging)
[2.00,0.01]PERFORMANCE DESIGN (in Theme 46,Emerging)
[2.00,1.00]TIME NEEDED (in Theme 141,Emerging)
[2.00,0.02]DESIGN TEST (in Theme 176,Popularity)
[2.00,0.01]SPECIFIC PROGRAMS (in Theme 120,Emerging)
[2.00,0.01]ANALYSIS MANAGEMENT (in Theme 15,Anomaly)
[2.00,0.04]SYSTEMS REQUIRE (in Theme 46,Emerging)
[2.00,0.03]TECHNICAL CAPABILITIES (in Theme 67,Anomaly)
[2.00,0.50]PROGRAM PRIOR (in Theme 157,Popularity)
[2.00,0.02]SPECIFIC DESIGN (in Theme 120,Emerging)
[2.00,0.13]PROGRAM TYPE (in Theme 169,Emerging)
[2.00,0.02]ENSURE READINESS (in Theme 172,Popularity)
[2.00,0.08]MAINTENANCE PRACTICES (in Theme 131,Anomaly)
[2.00,0.04]ITEM MANAGERS (in Theme 42,Anomaly)
[2.00,0.01]SYSTEMS PERFORMANCE (in Theme 46,Emerging)
[2.00,0.07]APB COST (in Theme 157,Popularity)
[2.00,0.04]TRANSPORTATION MANAGEMENT (in Theme 115,Anomaly)
[2.00,0.01]INTEGRATED TESTING (in Theme 179,Anomaly)
[2.00,0.02]TESTING SUSTAINMENT (in Theme 179,Anomaly)
[2.00,0.03]PRIMARY OBJECTIVES (in Theme 157,Popularity)
[2.00,0.08]OSD LOGISTICS (in Theme 166,Anomaly)
[2.00,0.10]CPI CRITICAL (in Theme 141,Emerging)
[2.00,0.10]TRAINING CONCEPTS (in Theme 179,Anomaly)
[2.00,0.05]SEPARATE PROGRAM (in Theme 15,Anomaly)
[2.00,1.00]SYSTEM MODIFICATION (in Theme 46,Emerging)
[2.00,0.50]IDENTIFY REQUIRED (in Theme 67,Anomaly)
[2.00,1.00]DESIGN STANDARD (in Theme 167,Popularity)
[2.00,1.00]MAJOR FEDERAL (in Theme 154,Emerging)
[2.00,0.02]INTEGRATION RISK (in Theme 176,Popularity)
[2.00,0.01]TECHNICAL REPORTS (in Theme 168,Anomaly)
[2.00,0.03]TERM PROGRAM (in Theme 108,Anomaly)
[2.00,0.20]ASSESS PROGRAM (in Theme 22,Anomaly)
[2.00,0.02]IDENTIFY RISK (in Theme 67,Anomaly)
[2.00,0.01]EVALUATION CENTER (in Theme 169,Emerging)
[2.00,0.01]SUPPORT PROCESS (in Theme 157,Popularity)
[2.00,0.01]EVALUATION PROCESS (in Theme 157,Popularity)
[2.00,0.25]APPROVED CONTRACT (in Theme 75,Anomaly)
[2.00,0.04]FORMAL TESTING (in Theme 70,Anomaly)
[2.00,0.06]COST CONSIDERATIONS (in Theme 154,Emerging)
[2.00,0.03]SYSTEM INTERFACE (in Theme 99,Emerging)
[2.00,0.03]PERFORMANCE RISKS (in Theme 108,Anomaly)
[2.00,0.05]BUDGET DATA (in Theme 176,Popularity)
[2.00,0.50]SUBMIT PROGRAM (in Theme 176,Popularity)
[2.00,0.03]CONDUCT MAINTENANCE (in Theme 46,Emerging)
[2.00,0.03]PRIMARY SUSTAINMENT (in Theme 157,Popularity)
[2.00,0.05]SUPPORTING SYSTEM (in Theme 95,Anomaly)
[2.00,0.02]REVIEWS PERFORMANCE (in Theme 157,Popularity)
[2.00,0.09]DISPOSAL PLANNING (in Theme 120,Emerging)
[2.00,0.07]SYSTEMS AGENCY (in Theme 154,Emerging)
[2.00,0.02]SINGLE CONTRACT (in Theme 145,Anomaly)
[2.00,0.01]INITIAL OPERATING (in Theme 176,Popularity)
[2.00,0.01]TESTING REQUIRED (in Theme 179,Anomaly)
[2.00,0.03]PROGRAM FUNCTIONS (in Theme 111,Emerging)
[2.00,0.01]NAVY PROGRAM (in Theme 124,Anomaly)
[2.00,0.07]MILITARY PERSONNEL (in Theme 167,Popularity)
[2.00,0.03]REQUIRE SUPPORT (in Theme 46,Emerging)
[2.00,0.01]MANAGEMENT ISSUES (in Theme 46,Emerging)
[2.00,0.20]INTERFACE CONTROL (in Theme 172,Popularity)
[2.00,0.05]EQUIPMENT COMPONENT (in Theme 157,Popularity)
[2.00,0.00]BASED PROCESS (in Theme 157,Popularity)
[2.00,0.09]ENGINEERING CONCERNS (in Theme 124,Anomaly)
[2.00,1.00]GUIDES LIFE_CYCLE (in Theme 108,Anomaly)
[2.00,0.04]REQUIRES ACQUISITION (in Theme 167,Popularity)
[2.00,0.02]DETAILED ENGINEERING (in Theme 176,Popularity)
[2.00,0.06]CRITERIA EQUIPMENT (in Theme 68,Anomaly)
[2.00,0.01]REQUIRED REPORTS (in Theme 168,Anomaly)
[2.00,0.08]FUNDING CONTRACT (in Theme 176,Popularity)

[2.00,0.06]PHYSICAL CAPABILITIES (in Theme 67,Anomaly)
[2.00,0.10]ENSURE TIMELY (in Theme 155,Anomaly)
[2.00,0.06]WORKLOAD ALLOCATION (in Theme 68,Anomaly)
[2.00,0.03]INTEGRATION PROGRAM (in Theme 42,Anomaly)
[2.00,0.04]MANAGEMENT FUNCTIONS (in Theme 111,Emerging)
[2.00,1.00]DETAILED PROGRAM (in Theme 176,Popularity)
[2.00,0.02]INFRASTRUCTURE MAINTENANCE (in Theme 99,Emerging)
[2.00,0.01]TIME COST (in Theme 141,Emerging)
[2.00,0.02]FUTURE MAINTENANCE (in Theme 176,Popularity)
[2.00,0.17]DATA ENTRY (in Theme 95,Anomaly)
[2.00,0.04]ORGANIC SOFTWARE (in Theme 169,Emerging)
[1.00,0.01]ACQUISITION PLANNING (in Theme 157,Popularity)
[1.00,0.00]DATA SYSTEMS (in Theme 172,Popularity)
[1.00,0.03]FACILITIES HARDWARE (in Theme 169,Emerging)
[1.00,0.01]DEVELOPMENT RELIABILITY (in Theme 124,Anomaly)
[1.00,0.01]PBL APPROACH (in Theme 67,Anomaly)
[1.00,0.03]DOD PROGRAMS (in Theme 167,Popularity)
[1.00,0.01]TEST PLANNING (in Theme 176,Popularity)
[1.00,0.03]DOD RAM (in Theme 167,Popularity)
[1.00,0.01]TECHNICAL ASSESSMENT (in Theme 46,Emerging)
[1.00,0.01]DESIGN ACQUISITION (in Theme 157,Popularity)
[1.00,0.03]PRODUCT_SUPPORT STRATEGY (in Theme 149,Anomaly)
[1.00,0.02]DOD MODELING (in Theme 167,Popularity)
[1.00,0.01]SUPPORT ACQUISITION (in Theme 157,Popularity)
[1.00,0.00]SYSTEMS ACQUISITION (in Theme 157,Popularity)
[1.00,0.13]CONTRACT TYPE (in Theme 167,Popularity)
[1.00,0.01]LOGISTICS TRAINING (in Theme 169,Emerging)
[1.00,0.00]CONTROL ACTIVITIES (in Theme 172,Popularity)
[1.00,0.02]SPECIFIC FAILURE (in Theme 120,Emerging)
[1.00,0.01]PERFORMANCE ASSESSMENT (in Theme 46,Emerging)
[1.00,0.01]SERVICE CONTRACTS (in Theme 157,Popularity)
[1.00,0.10]PROCUREMENT PROCESS (in Theme 157,Popularity)
[1.00,0.02]SYSTEM PERFORMANCE (in Theme 172,Popularity)
[1.00,0.03]DOD ORGANIZATIONS (in Theme 167,Popularity)
[1.00,0.01]PERFORMANCE ENGINEERING (in Theme 46,Emerging)
[1.00,0.04]PRODUCTION DEPLOYMENT (in Theme 157,Popularity)
[1.00,0.02]MATERIAL COSTS (in Theme 120,Emerging)
[1.00,0.01]SYSTEM PROGRAM (in Theme 176,Popularity)
[1.00,0.03]OPERATIONS SUSTAINMENT (in Theme 157,Popularity)
[1.00,0.00]PROCUREMENT PACKAGE (in Theme 120,Emerging)

Appendix B: Overview of Lexical Link Analysis

As in military operations, where the term *situational awareness* was coined, we note that our efforts can inform *awareness* of analyzed data in a unique way that helps improve a decision-maker's understanding or awareness of the data's content. We, therefore, define awareness as the cognitive interface between decision-makers and a complex system, expressed in a range of terms or features, or a specific vocabulary or lexicon, to describe the attributes and surrounding environment of the system. Specifically, LLA is a form of text mining in which word meanings represented in lexical terms (e.g., word pairs) can be represented as if they are in a community of a word network.

Link analysis discovers and displays a network of word pairs. These word pair networks are characterized by one-, two-, or three-word themes. Figure 6 shows a visualization of common lexical links shared between Systems 1 and 2, shown in the red box. A system, or a corpus, can be a collection of documents for an actual physical system (e.g., acquisition strategies for a Navy ship-building program) or simply a category of information. A node in Figure 6 represents a word in a corpus and a link or edge represents a word pair. A word pair is a bi-gram (Manning & Schütze, 1999) word pair extracted from the corpus. Within the field of computational linguistics, an n-gram is a sequence of n items matched to certain probabilistic patterns from a given text. Size 2 of an n -gram is a bi-gram. In Figure 6, each link color refers to the collection of words, lexicon, or features that belongs to a cluster that describes a concept or theme. In overlapping areas, nodes are *lexically linked*. Unlinked, outer vectors (outside the red box) indicate unique system features. Figure 7 shows the information from three categories that can be compared, and Figure 8 shows the information from two time periods that can be compared. What is unique here is that LLA

constructs these linkages via intelligent agent technology using social network grouping methods.

The closeness of the systems in comparison can be examined visually or using the quadratic assignment procedure (QAP; Hubert & Schultz, 1976 [e.g., in UCINET]; Borgatti, Everett, & Freeman, 2002) to compute the correlation of two sets of lexical terms from two systems and analyze the structural differences in the two systems, as shown in Figure 9.

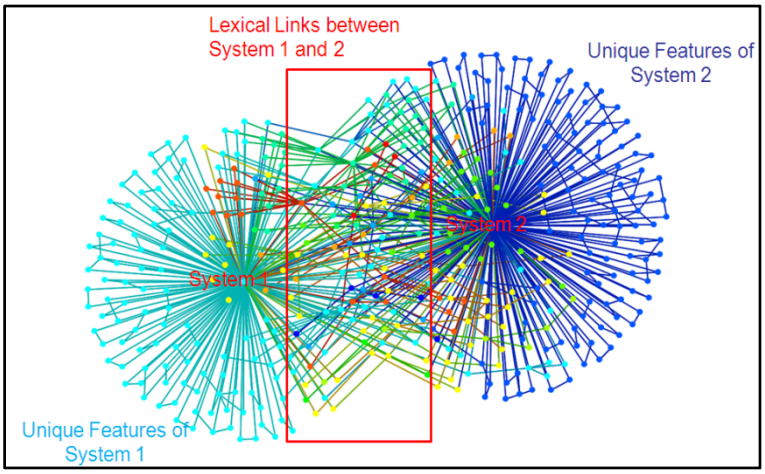

Figure 6. Comparing Two Systems Using LLA

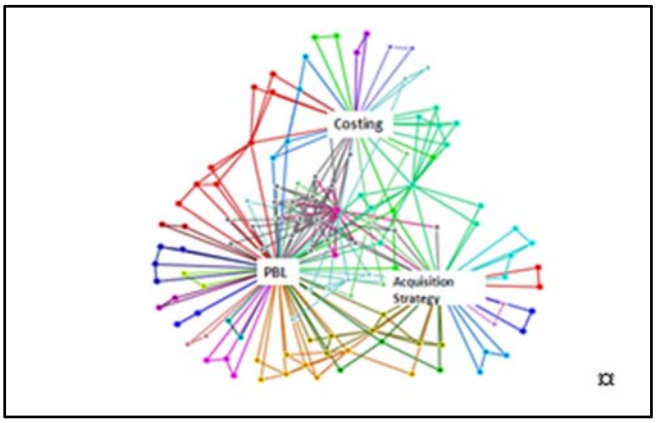

Figure 7. Comparing Three Categories

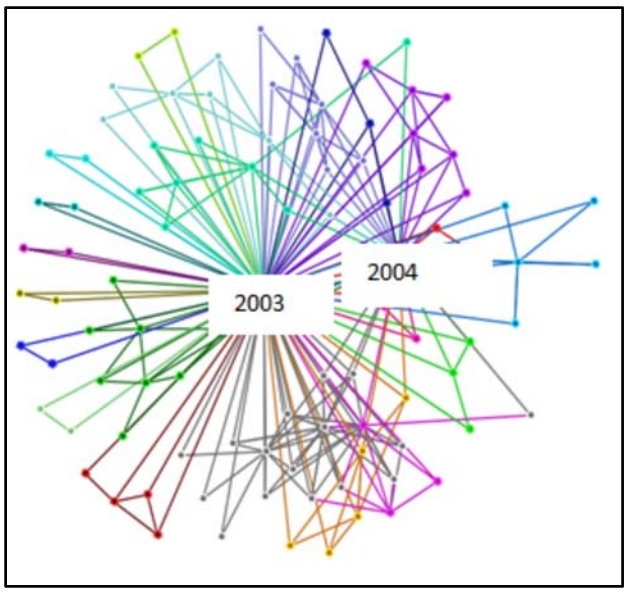

Figure 8. Comparing Two Time Periods

QAP Correlations

		1 lla_n	2 lla_n	3 lla_n	4 lla_n	5 lla_n	6 lla_n	7 lla_n	8 lla_n
1	lla_network_1_2010-AcquisitionStrategy	1.000	0.174	0.156	0.155	0.036	0.111	0.020	0.062
2	lla_network_1_2003-AcquisitionStrategy	0.174	1.000	0.447	0.149	0.052	0.119	0.043	0.089
3	lla_network_1_2004-AcquisitionStrategy	0.156	0.447	1.000	0.111	0.047	0.119	0.051	0.080
4	lla_network_1_2005-AcquisitionStrategy	0.155	0.149	0.111	1.000	0.156	0.084	0.034	0.088
5	lla_network_1_2006-AcquisitionStrategy	0.036	0.052	0.047	0.156	1.000	0.067	0.036	0.056
6	lla_network_1_2007-AcquisitionStrategy	0.111	0.119	0.119	0.084	0.067	1.000	0.097	0.123
7	lla_network_1_2008-AcquisitionStrategy	0.020	0.043	0.051	0.034	0.036	0.097	1.000	0.286
8	lla_network_1_2009-AcquisitionStrategy	0.062	0.089	0.080	0.088	0.056	0.123	0.286	1.000

QAP P-Values

		1 lla_n	2 lla_n	3 lla_n	4 lla_n	5 lla_n	6 lla_n	7 lla_n	8 lla_n
1	lla_network_1_2010-AcquisitionStrategy	0.000	0.020	0.020	0.020	0.020	0.020	0.020	0.020
2	lla_network_1_2003-AcquisitionStrategy	0.020	0.000	0.020	0.020	0.020	0.020	0.020	0.020
3	lla_network_1_2004-AcquisitionStrategy	0.020	0.020	0.000	0.020	0.020	0.020	0.020	0.020
4	lla_network_1_2005-AcquisitionStrategy	0.020	0.020	0.020	0.000	0.020	0.020	0.020	0.020
5	lla_network_1_2006-AcquisitionStrategy	0.020	0.020	0.020	0.020	0.000	0.020	0.020	0.020
6	lla_network_1_2007-AcquisitionStrategy	0.020	0.020	0.020	0.020	0.020	0.000	0.020	0.020
7	lla_network_1_2008-AcquisitionStrategy	0.020	0.020	0.020	0.020	0.020	0.020	0.000	0.020
8	lla_network_1_2009-AcquisitionStrategy	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.000

QAP statistics saved as datafile QAP Correlation Results

Figure 9. QAP Correlation via UCINET

Figure 10 shows a visualization of LLA with connected keywords or concepts as clusters, groups, or themes. Words are linked as word pairs that appear next to each other in the original documents. Different colors indicate different clusters of word groups. They were produced using a social network community detection method (Girvan & Newman, 2002) where words are connected, as shown in a single color, as if they are in a social community. A word center is formed around a word node connected with a list of other words in word pairs. For instance, Figure 11 shows a detailed view of a theme or word group in Figure 10. The center words are analysis, research, and approach. In this example, we use three words such as “analysis, research, approach” to label such a group, where the top three words are those with the highest total degree of centralities (Freeman, 1979; Wasserman & Faust, 1994).

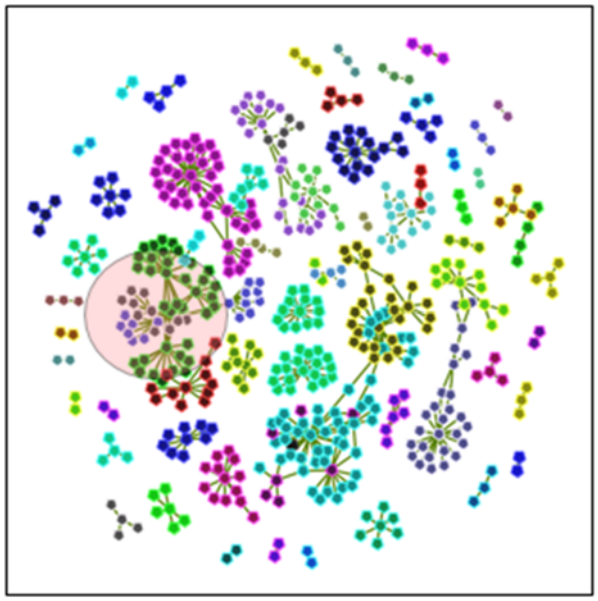

Figure 10. Word and Term of Themes Discovered and Shown in Colored Groups

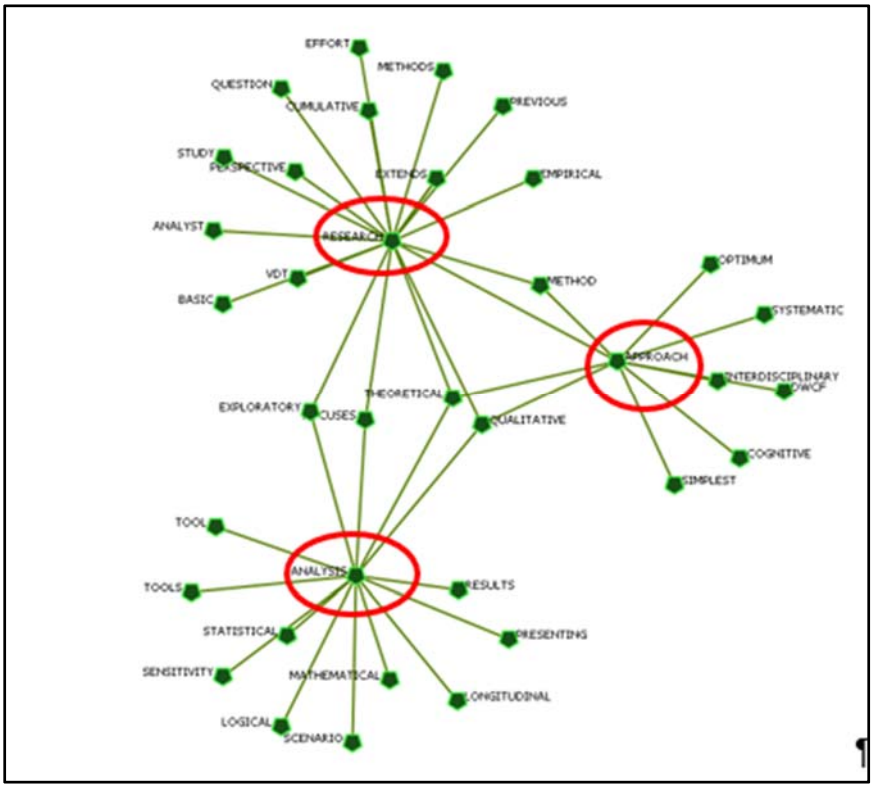

Figure 11. A Detailed View of a Theme or Word Group From Figure 10

The detailed steps of LLA processing include the following:

- Step 1: Select word pairs based on the following bi-gram parameters:
  - the probability threshold for one word next to another word in a word pair and

    - the minimum frequency for each individual word.
- Step 2: Apply a social network community-finding algorithm (i.e., Newman community detection method; Girvan & Newman, 2002) to group the word pairs into themes. A theme includes a cluster of lexical word pairs connected to each other.
- Step 3: Compute a "weight," or an importance measure, for a theme.
- Step 4: Sort theme weights by time and study the distributions of the themes by time.

The outputs of LLA include lexical network visualizations such as the ones in Figures 6–11; radar visualization; and matrix visualization (Zhao, Gallup, & MacKinnon, 2010). The word pair groups or themes as shown Figure 10 and 11 are further divided into three types according to the weights in Step 3:

- Popular (P): themes containing the highest number of mutually connected word pairs. The themes represent the main topics in a corpus at the time. The theme represented in Figure 11 is an example of a popular theme.
- Emerging (E): themes containing the medium number of mutually connected word pairs. These themes may grow to be popular over time.
- Anomalous (A): themes containing the lowest number of mutually connected word pairs. These themes may be off-topics compared to other themes and may be interesting for further investigation.

Business Problems That LLA Addresses

As a text analysis tool, LLA typically addresses the business problems of discovering themes and topics in unstructured documents and sorting the importance of the themes accordingly. Current methods, for example, internet search methods of ranking pages, require established hyperlinks, citation networks, or other forms of crowd-sourced collective intelligence. LLA is especially useful for data without hyperlinks and citation networks, for example, large-scale government internal documents. Furthermore, current methods typically rank the importance of the information based on its popularity. For example, we found that in many business applications, it is useful to rank information based on emerging importance or anomalousness.

Current research on social network analysis focuses mostly on people or organizations with direct associations regardless of the contents linked. The so-called study of centrality (Girvan & Newman, 2002; Feldman & Sanger, 2007) has been a focal point for the social network structure study. Finding the centrality of a network lends insight into the various roles and groupings such as the connectors (e.g., mavens, leaders, bridges, isolated nodes), the clusters (and who is in them), the network core, and its periphery (Orgnet, 2011).

One of the core innovations of LLA is to analyze the content (e.g., documents and social media communications) created by social entities (e.g., people or organizations) and, therefore, create alternative networks (i.e., semantic networks) to traditional social networks. The resulting networks from LLA examine both social and semantic networks in terms of the organizations and people involved in the important themes, and how semantic networks might suggest improved potential collaborations and predict future outcomes.

Implementation Details

In the past year, we continued our efforts at the Naval Postgraduate School (NPS) by using collaborative learning agents (CLAs; QI, 2009) and other tools, including AutoMap (Center for Computational Analysis of Social and Organizational Systems [CASOS], 2009) for improved visualizations. Results from these efforts arose from leveraging intelligent agent technology via an educational license with Quantum Intelligence, Inc. CLA is a computer-based learning agent, or agent collaboration tool, capable of ingesting and processing data sources.

We have been generating visualizations including a lexical network visualization using various open source tools. We began by using the Organizational Risk Assessment (ORA; CASOS, 2009) tool and expanded to other tools. For example, in the past year, we developed 3-D network views using Pajek (Batagelj, Mrvar & Zaveršnik, 2011) and X3D (Web3D, 2011). We also developed our visualizations radar view and match view (Zhao at al., 2010).

LLA uses a computer-based learning agent called CLA (QI, 2009) to employ an unsupervised learning process that separates patterns and anomalies. Unsupervised agent learning is implemented by indexing each set of documents separately and in parallel using multiple learning agents. Unsupervised agents are used because the learning data for supervised agents are expensive to obtain. Multiple agents can work collaboratively and in parallel. We set up a cluster utilizing Linux servers in the NPS High Performance Computing Center (HPC) to handle the large-scale data and the secure environment in the NPS Secure Technology Battle Laboratory (STBL).

Relations to Other Methods

The LLA approach is more properly related to latent semantic analysis (LSA; Dumais, Furnas, Landauer, & Deerwester, 1988) and probabilistic latent semantic analysis (PLSA). In the LSA approach, a term-document matrix is the starting point for analysis. The elements of the term-document or feature-object (term as feature and document as object) matrix are the occurrences of each word in a particular document (i.e., A = a_{ij}], where a_{ij} denotes the frequency in which term j occurs in document i). The term-document matrix is usually sparse. LSA uses singular value decomposition (SVD) to reduce the dimensionality of the term-document matrix. SVD cannot be applied to the cases where the vocabulary (the unique number of terms) in the document collection is large; for example, the number of unique terms in the DoD's acquisition documentation approaches the "large" value that would make SVD inapplicable. LSA has been widely used to improve information indexing, search/retrieval, and text categorization.

A recent development related to this method is called latent Dirichlet allocation (LDA; Blei, Ng, & Jordan, 2003), which is a generative probabilistic model of a corpus. In LDA, a document is considered to be composed of a collection of words, a "bag of words," where word order and grammar are not considered important. The basic idea is that documents are represented as random mixtures over latent topics, where each topic is characterized by a statistical distribution (*Dirichlet* distribution) over the corpus.

Our theme generation from LLA is different than from LDA, in which a collection of lexical terms is connected to each other semantically, as if the terms are in a social community, and social network grouping methods are used to group the words. Also unlike LSA, our method is easily scaled to analyze a large vocabulary and is generalizable to any sequential data.

Anticipated Benefits

Our LLA method provides solutions to meet the critical needs of the acquisition research community. The key advantage is to provide an innovative near-real-time self-awareness system to transfer diversified data services into strategic decision-making knowledge, specifically through the following:

- Automation: High correlation of LLA results—with the link analysis done by human analysts—makes it possible to save human power and improve responsiveness. Automation is achieved via computer program or software agents to perform LLA frequently—and in near real-time.
- Discovery: LLA "discovers" and displays a network of word pairs. These word pair networks are characterized by one-, two-, or three-word themes. The weight of each theme is determined based on its frequency of occurrence. LLA may also discover blind spots of human analysis that are caused by the overwhelming amount of data for human analysts to consider.
- Validation: LLA may provide different perspectives of links. In the acquisition context, links discovered by human analysts may emphasize component and part connections that do not necessarily reflect content overlaps.Consequently, it can provide improved results in terms of trust, quality of association, and discovery; can help break through the taxonomy of ignorance (Denby & Gammack, 1999) and organizational boundaries; and can help improve organizational reach.

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